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Innovation in Services and Stakeholder Interactions:

Cases from Facilities Management

Ph.D. Dissertation

2014

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Innovation in services and stakeholder interactions: cases from Facilities Management

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Copenhagen, Giulia Nardelli

August 2014

ABSTRACT

Services are increasingly becoming a crucial driver of the economies of developed countries. At the same time, innovation is not only recommended, but also required, to ensure survival and growth of organisations, within the manufacturing as well as the service sectors. Given globalisation and the development of information and communication technologies, more and more heterogeneous parties are and might be involved in innovation processes; meaning that both manufacturers and service providers shall take into consideration a more diverse set of needs and expectations when developing new offerings. Within the service context, specifically, empirical evidence and existing research suggest that interactions between stakeholders are an important element of innovation processes. Therefore, when managing and studying innovation in the service context, interactions between stakeholders should be taken into consideration.

So far, the literature on innovation in services has addressed some of the aspects of interactions between stakeholders, such as customer involvement and open innovation practices. Nevertheless, when looking at innovation processes in services, scholars have typically adopted a firm-centric approach and taken into consideration only the perspective of the service-providing organisation. The perspective of the beneficiary of the service, however, as well as that of other stakeholders, is a crucial element for the understanding of innovation in services and related interactions. In fact, given the recognition that services are characterised by interactivity between stakeholders, the perspective of the service beneficiary determines the way an outcome is co-produced. This dissertation investigates how interactions between stakeholders unfold throughout innovation processes in services, and how service organisations and their stakeholders navigate and manage such unfolding to reach successful outcomes.

Grounded in the literature and theories on innovation in services, this dissertation adopts a qualitative approach and emphasises the empirical context of facilities management services. Facilities management services are a set of support services. They are meant to ensure that the employees of an organisation can carry out the tasks and activities related to the core business, without having to worry about, for example, the management of the workplace, catering and cleaning, security and safety. Facilities management services are categorised as task-interactive services, i.e., are centred on the close interaction between demand and supply, and were selected as empirical field of investigation because they allow to transparently observe interactions between stakeholders throughout innovation processes.

To reach the research aim, this dissertation includes five papers with different objectives and questions, which touch upon various aspects of innovation in services while maintaining a dedicated focus on the interactions between stakeholders. As a consequence, I combined a shared qualitative approach with a varied research approach (inductive, abductive and deductive), which includes a literature review and four empirical papers. The empirical work for this dissertation includes an explorative study, three mini case studies and an in-depth longitudinal case study. The collected data range from interviews to archive data and passive observation, and the data analysis was carried out through a systematic approach to coding supported by the qualitative data analysis software Atlas.ti (v.6).

Overall, this dissertation offers several contributions to theory and practice. First of all, this work stresses the role of stakeholder management for the success of innovation processes, and outlines a series of methods and tools that might support dealing with heterogeneous parties when aiming for innovation. Furthermore, and perhaps more interestingly, this work underlines that interactions between stakeholders are one of the driving and characterising elements of innovation processes in services. In short, the organisation trajectory, i.e., the development over time of the business model of an organisation, is dependent on changes in the business model of its stakeholders. But interactions between stakeholders play a crucial role in all types of innovation processes, not only business model innovation: tensions and conflicts between diverse parties are one of the driving forces behind innovation processes in services. Therefore service organisations should carefully identify and, when possible, select their stakeholders to maximise the potential of interactions. Moreover, service organisations should evaluate how each set of stakeholders should be involved in different types of innovation processes, and manage interactions through change and expectation management.

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PART I: SYNOPSIS

INTRODUCTION

This dissertation investigates dynamics of interaction between stakeholders during processes of innovation in the service context, and, more specifically, within facilities management services. In this first section, I outline an overall introduction to my Ph.D. research and this dissertation. I start by introducing the motivation and background, to then present the theoretical positioning and define the main concepts as applied in the dissertation. After having portrayed the empirical field of the investigation, I then depict the research objectives and research questions, which this work aims at answering. Finally, I outline the structure of the dissertation.

Motivation and background

Services are increasingly becoming a crucial driver of the economies of developed countries (Martinsson, 2012; Wölfl, 2005). OECD research stresses that, if the aim of economic policies is to increase economic growth, it is important to emphasise the service industry. After having increasingly grown to become the quantitatively most important industry in all OECD economies, services accounted for approx. 70% of aggregate production and employment in OECD countries as of 2013 (OECD, 2013). At the same time, to ensure survival and growth of organisations it is a requirement to constantly innovate (OECD, 2013), within the manufacturing as well as the service sectors (e.g., Chesbrough, 2003; Teece, 2010). This is mainly due to globalisation and the development of information and communication technologies (ICT), which characterise today's economic and social environment (OECD, 2013) while having increased competition and complexity of interaction between diverse actors (Teece, 2010). For instance, service providers who deal with processes of internationalisation and have to coordinate among local and global stakeholders, as well as service innovators who use online communities to co-create value with external parties, are involved in, and need to deal with, heterogeneous service systems (Ling et al., 2006). In other words, more and more heterogeneous parties are and might be involved in innovation processes; meaning that both manufacturers and service providers shall take into consideration a more diverse set of needs and expectations when developing new offerings (Nardelli, 2014a).

When Disney opened its theme park in Paris in 1992, for example, it used the very same approach that had previously worked well in the USA. Nonetheless, Disney soon enough realised that European employees, suppliers, competitors, and, most of all, customers, differed from American stakeholders. As a consequence, Disney was forced to consistently change its approach for the park in Paris to achieve success (Magretta, 2002), by creating a better fit with the characteristics of European stakeholders. Had Disney interacted with the newly approached

European stakeholders throughout the innovation process, it would have perhaps been able to launch an innovative and successful set of entertainment services right from the start.

Services, in fact, tend to involve customer participation in the service process (whether such participation is planned or not) and to be (1) intangible; (2) simultaneously produced and consumed; (3) perishable; and (4) heterogeneous (Fitzsimmons & Fitzsimmons, 2006). The importance of co-production between service providers and their customers has been spotted as one of the distinguishing characteristics of innovation within services as compared to tangible products (Bryson, Rubalcaba, & Ström, 2012; Hertog, Aa, & Jong, 2010). Also, scholars of innovation receptively stressed that service providing organisations should make sure to actively interact not only with customers, but with all stakeholders throughout their innovation processes, be they aimed at developing new offerings or the organisational processes behind existing ones (Chesbrough, 2011; Hsueh, Lin, & Li, 2010; Vargo & Lusch, 2004, 2011). The active interaction with stakeholders during innovation processes, in fact, may lead to increased customer satisfaction; services with lower failure rates; better relationships with partners, suppliers and competitors; and, eventually, increased competitive advantage and service innovation performance (Alam & Perry, 2002; Jiménez-Zarco, Martínez-Ruiz, & Izquierdo-Yusta, 2011; Jong & Vermeulen, 2003; Matthing, Sandén, & Edvardsson, 2004).

The case of El Bulli, the restaurant of 3-Michelin Stars chef Ferran Adriá, for instance, shows how the close relationships with few selected partners allowed the organisation to consistently grow and innovate over time, by developing corollary services through carefully managed interactions with stakeholders (Chesbrough, 2011; Svejenova, Planellas, & Vives, 2010). Corollary services are spin-off offerings that follow from and are appended to the original offering (Oxford University Press, 2014a). In this case, the original and core offering is the dining experience in the restaurant El Bulli. Examples of corollary services are the Fast Good restaurants, which deliver fast food of higher quality and Nhube, which combines the lounge, the restaurant and the café-bar of hotels in one single space. Both innovations were co-developed by combining the capabilities and resources of El Bulli restaurant with those of NH Hotels, who then both benefited from the success of the initiatives (Chesbrough, 2011).

On the other hand, actively interacting with stakeholders does not always yield positive results. By taking the perspective of the customer instead of that of the service providers, Sjödin and Kristensson (2012), for example, studied the case of a renowned zoo in Sweden. They asked visitors to contribute to the idea generation of the innovation process, and outlined an unexpected outcome: customers had mixed opinions about the experience. Favourable experiences, such as benevolence toward, and deepened relationships with, the zoo were actually balanced by negative impressions such as incapability to perform the requested tasks and intrusion feelings (Sjödin & Kristensson, 2012).

Empirical evidence thus suggests that interactions between stakeholders are an important element of innovation processes within the service context, and should be taken into consideration when managing innovation. The focus of this dissertation, however, is not on the impact that interactions between stakeholders have on innovation in the service context. Rather, this dissertation investigates how such interactions unfold, and how service organisations—and their stakeholders—navigate and manage such unfolding of relationships to reach successful outcomes. This is reflected in the theoretical positioning of this dissertation, whose scope is framed within literature on innovation in services, with emphasis on interactions between stakeholders. I refer to *navigation of interactions* to incorporate the heterogeneity, variance and uncertainty that characterises the relations between parties during innovation processes in services (e.g., Fuglsang, Sundbo, & Sørensen, 2011; Matthing et al., 2004; Ordanini & Maglio, 2009; Sjödin & Kristensson, 2012). Nevertheless, such heterogeneity, variance and uncertainty might be prevented and acted upon to a certain degree through a dedicated effort (e.g., Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011), hence the mention to *management of interactions*.

Please notice that, while I acknowledge the stream of literature on interaction theory and the interactionist approach, I here define interactions as *the reciprocal action or influence of two or more parties on each other* (Oxford University Press, 2014b), to describe relationship dynamics and exchange actions between stakeholders.

Earlier research

This work builds on existing literature on the relevance and role of interactions between stakeholders within processes of innovation in services. For instance, a well-known stream of studies focuses on the involvement of users and customers during innovation processes in the service context (see, e.g., Alam & Perry, 2002; Alam, 2002; Bitner, Ostrom, & Morgan, 2008; Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011). More broadly, the recent work on open innovation defines innovation in services as the outcome of complex interactions between agents, capabilities and preferences (see, e.g., Bryson et al., 2012; Chesbrough, 2003, 2011; West, Salter, Vanhaverbeke, & Chesbrough, 2014). Across the literature, two main models of innovation processes in services emerged, i.e., stage-gate and practice-driven models. On one hand, stage-gate models postulate that service providers do (and if they do not, they should) follow the example of manufacturers, and structure innovation activities and stakeholder interactions in formalised steps and phases (e.g., Abramovici & Bancel-Charensol, 2004; Busse & Wallenburg, 2011; Johne & Storey, 1998; Melton & Hartline, 2010; Mota Pedrosa, 2012). On the other hand, research on the practice-driven model has shown how innovation in services often functions as a trial-and-error, overlapping process. Throughout such process, improvements are started and managed in response to market opportunities and/or customer dissatisfaction, and recognised as

innovation outcomes only after commercialisation (e.g., Edvardsson, Haglund, & Mattson, 1995; Martin & Horne, 1993). Similarly to the findings on stage-gate models, the potential of stakeholder interactions for practice-driven innovation has been recognised (e.g., Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011). Within such processes, however, the dynamics of exchange between parties have been depicted as parallel, interactive and overlapping, rather than straightforward and easily manageable, as in stage-gate models of innovation in services (Fuglsang et al., 2011; Matthing et al., 2004; Ordanini & Maglio, 2009).

Nevertheless, the literature on innovation in services that focuses on processes has mainly adopted a firm-centric approach (Bryson et al., 2012; Nardelli, 2014a). In other words, when looking at the interactions between stakeholders, only the perspective of the service-providing organisation has been taken into consideration (Sjödin & Kristensson, 2012). The perspective of the beneficiary of the service, however, as well as that of other stakeholders, is a crucial element for the understanding of innovation in services and related interactions (see, e.g., Brockhoff, 2003), as it determines the way an outcome is co-produced and value is co-created (Vargo & Lusch, 2007).

To summarise, the combination of empirical instances and previous research on innovation in services suggests that interactions between stakeholders might represent a crucial issue to address when investigating—and managing—innovation processes, and particularly so within the service context. The fact that the majority of studies adopt a firm-centric perspective, despite that stakeholders do not always perceive interactions as a positive experience, calls for research that also takes into consideration the point of view of stakeholders other than the service-providing firm. The umbrella research aim, on which this dissertation is built upon, is therefore:

> *To investigate how interactions between stakeholders unfold throughout innovation processes in services, and how service organisations and their stakeholders navigate and manage such unfolding to reach successful outcomes.*

Definition of main concepts

What does innovation in services mean, and how is it defined in this dissertation? I define innovation as the first commercialisation of an idea for a new product or process, i.e., offering, method of production, source of supply, market and/or way of organising business, which is reproduced or applied more than once (Fagerberg, 2006, p. 3). Moreover, innovation shall bring a benefit to its developer, which derives from the added value that the new product or process brings to the customers (Kline & Rosenberg, 1986; Sundbo, 1997). Furthermore, when talking about innovation, it is possible to distinguish between (1) the process that leads from the emergence of an idea to its development and launch, and (2) its outcome, i.e., the new product or process that it being commercialised (Gallouj & Weinstein, 1997). Services are considered as a

specific type of offering that is defined as the economic activities offered by one party to another, which result in a time-perishable, intangible experience in which both parties act as co-producers (Fitzsimmons & Fitzsimmons, 2006).

In this dissertation, the service context delineates the scope of the investigation; while innovation, and, more specifically, *innovation processes* constitute the object of the investigation. As the term *process* might be interpreted in various ways, it is worthwhile to clarify how it is defined in this dissertation. In the attempt to summarise existing theories, Van de Ven and Poole (1995) present three main interpretations of processes in management literature:

1. As underlying logic that explains the causal relationship between independent and dependent variables in variance theories;
2. As a category of concepts of organisational actions, e.g., communication, work flows, decision making and so on;
3. As the progression, i.e., order and sequence, of events in the existence of an organisational entity over time.

This synopsis (Part I) and five academic papers (Part II) compose this dissertation. Table 1 introduces the five papers that are included in Part II, and depicts the interpretation of processes as applied in each work. In fact, in this dissertation:

- The second interpretation of the term is applied when referring to innovation processes as *sets of activities that start with the generation of ideas and ensure development, implementation and launch of innovation outcomes* (Crossan & Apaydin, 2010; Sundbo, 1997; Toivonen & Tuominen, 2009), and, more specifically, in papers 2, 3, 4 and 5;
- The third meaning of the term is used in paper 1, in which I investigate the business model innovation process of organisational entities, and thus define process as *the progression of events in the existence of such entities over time* (Achtenhagen, Melin, & Naldi, 2013; Demil & Lecocq, 2010; Doz & Kosonen, 2010).

Table 1: Overview of the papers that compose this dissertation with reference to the definition of process.

Paper number	Reference	Title	Process defined as:
Paper 1	Nardelli, 2014b	Value co-creation and business model innovation in services.	*Progression of events in the existence of organisational entities over time.*
Paper 2	Nardelli, 2014a	Stakeholder dialectics and innovation in services: A process perspective.	*Sets of activities that start with the generation of ideas and ensure development, implementation and launch of innovation outcomes.*
Paper 3	Nardelli, 2015	The interactions between innovation in services and ICT: A conceptual typology.	
Paper 4	Nardelli and Scupola, 2013	Involving users in complex service systems' innovation processes by means of ICT-based tools: The case of Facility Management Services.	
Paper 5	Nardelli, Jensen and Nielsen, 2015	Facilities management innovation in public-private collaborations: Danish ESCO projects.	

For a more detailed overview of the papers that compose this dissertation please refer to Table 2 on page 22.

Empirical field of investigation

Grounded in the literature and theories on innovation in services, this dissertation investigates interactions between stakeholders throughout innovation processes within the service context. Moreover, it extends the focus of the investigation beyond the perspective of the service-providing organisation, which has typically been adopted in existing research (Bryson et al., 2012; Nardelli, 2014a). To do so, I selected a specific field of investigation within the services industries, whose characteristics allow to transparently observe interactions between stakeholders during innovation processes, i.e., facilities management (FM) services.

FM services are a set of support services. They are meant to ensure that the employees of an organisation can carry out the tasks and activities related to the core business, without having to worry about, for example, the management of the workplace, catering and cleaning, security and safety. In other words, FM services involve the more or less integrated management of people, processes and places with the aim of supporting and improving the effectiveness of the primary activities of an organisation (Alexander, 1992). Examples of FM services include real estate management, workplace management and allocation, technical maintenance, cleaning, catering, security and safety, and so on (Jensen, 2008). Because of their supportive nature, FM services are based on a dependent relationship between demand and supply, which characterises them as *task-interactive services* (Mills & Margulies, 1980, p. 263). Task-interactive services are centred on the relatively concentrated interaction between demand and supply. Within this interaction, the supply focuses on how to satisfy needs and expectations of the demand: the demand is aware of its needs and expectations, but does not know how to satisfy them (Mills &

Margulies, 1980). Organisations, in fact, hire in-house or outsourced FM service providers to perform tasks that their regular employees are not able to carry out themselves, because of lack of specialisation in terms of skills and/or knowledge. This implies that the relationship between customers and providers is determined by the dependency of the first on the latter (Mills & Margulies, 1980), without which the organisation could not function (Coenen, Alexander, & Kok, 2013).

The reason why FM services allow transparently observing interactions between stakeholders lies in the participation of diverse internal and external actors in innovation processes within this context; actors who typically take along heterogeneous sets of needs and expectations (Coenen et al., 2013). The task-interactive nature of FM service providing calls for: (1) an extensive flow of information on the needs of the demand; (2) long-term relationships between parties; and (3) complex decision making on the providing side. Decisions are a function of, and depend on, the dynamic environment in which the client organisation operates, which require continuously novel solution to emerging problems (Mills & Margulies, 1980). As a consequence, when managing innovation processes, FM service providers shall take into consideration the needs and expectations of all stakeholders involved, and thus tend to closely interact with each other (Goyal & Pitt, 2007). Such interactions are transparently observable and comparable between cases. In fact, different stakeholders appear to have characteristics, needs and expectations that are similar within the same set, while being heterogeneous between different sets (Coenen et al., 2013).

Researchers of FM services have emphasised that innovation processes and outcome play a significant role with regards to the value that FM services might add to the core business of the organisations they serve (e.g., Jensen et al., 2012), along with the ability of FM practitioners to innovate (e.g., Cardellino & Finch, 2006; Mudrak, Wagenberg, & Wubben, 2005) and the need for partnership approaches to bridge between demand and supply when developing and implementing innovation (e.g., Goyal & Pitt, 2007). Yet, FM specialised literature mirrors research on innovation in services in that it lacks emphasis on the demand side of innovations (Coenen et al., 2013), which is one of the gaps this dissertation aims at filling in.

Research objectives

In this context, and within the umbrella aim presented above, specific gaps in existing literature and/or empirical problems allowed narrowing down the scope of the research into four research objectives:

- *Research objective 1: To investigate the unfolding of value co-creation throughout processes of open business model innovation in the service context.*

- *Research objective 2: To investigate the unfolding of tensions and potential conflicts between heterogeneous stakeholders throughout processes of innovation in the service context.*
- *Research objective 3: To investigate the relationship between innovation in services and ICT.*
- *Research objective 4: To investigate the proactive involvement of heterogeneous stakeholders, and related support tools, throughout innovation processes in the service context by emphasising the perspectives of the different parties.*

First, I identified *value co-creation* as a construct that would allow including the perspective of stakeholders when investigating innovation processes in the service context. Value co-creation, in fact, is defined as a phenomenon in which diverse stakeholders interact to create *value*, from which all of them can benefit. Value is defined as a subjectively perceived change in the receiver's state of being (Vargo & Lusch, 2004, 2007). At the same time, business model innovation processes emerged as (1) a relevant issue for practitioners; (2) an emerging topic within the literature on innovation in the manufacturing and service contexts. Nonetheless, business model innovation is still under-researched by scholars of innovation in services (Bryson et al., 2012). In addition, despite the recognition of the role of value co-creation for innovation in services, it is yet to be depicted how, in services, value co-creation might unfold during business model innovation. With the first research objective I thus aimed at contributing to theories on business model innovation in services, and supporting a broader understanding of value co-creation and business model innovation processes within the service context.

Secondly, I looked at the *dark side of interactions between stakeholders*. From existing literature we know that innovation processes trigger (1) conflicting demand from different customers; (2) contradictory practices among the managers; and (3) competing views across stakeholders. This generates tensions and conflicts that might either boost or inhibit performance (Erez, Jarvenpaa, Lewis, Smith, & Tracey, 2013; Lewis, 2000; van Dijk, Berends, Jelinek, Romme, & Weggeman, 2011), hence the use of the metaphor *dark side of interactions*. Significant research effort was invested into role of and requirement for user involvement in service innovation (see, e.g., Alam, 2002, 2011, 2013; Bitner et al., 2008), and even more studies have been carried out to investigate the collaboration of different parties within new product development processes (e.g., Chesbrough, 2006; Nambisan, 2002; von Hippel, 1986). Nevertheless, interactions between providers and customers, and, more generally, stakeholders, have often been presented as collaborative (e.g., Alam, 2002; Bitner et al., 2008; Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011), so that tensions and potential conflicts during innovation processes still require attention and dedicated research. The second objective therefore focuses on contributing the theory on innovation processes in services by emphasizing the dark

side of interactions between stakeholders, a point of view that, within the service context, has not been paid extensive attention yet.

Thirdly, I focused on one set of technological tools, which has been shown to support innovation processes in services, i.e., information and communication technologies (ICT) (e.g., Bygstad & Lanestedt, 2009; Chesbrough, 2011; Targowski, 2009). Despite the extensive range of literature on the potential of ICT as support for innovation in services, Tether and Tajar (2008) launched a call for more and deeper knowledge on the interactions between innovation in services on ICT. The third research objective is a direct response to their call and emphasises both sides of the relationship to contribute to the literature on innovation in services and ICT. In fact, previous research has typically focused on the impact of ICT on innovation, or on the impact that different types of innovation have on ICT development (Nardelli, 2015).

Finally, I tackled a specific aspect of interactions throughout innovation in services, i.e., the proactive involvement of stakeholders and the related support tools. Again, I aimed at extending the firm-centric perspective that characterises existing research (e.g., Alam, 2002, 2011, 2013; Bitner et al., 2008; Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011), and therefore investigated the point of view of the different stakeholders, on their own involvement. The fourth and last research objective is thus centred on the aim to contribute to research on the involvement of the demand in innovation processes within the service context. In addition, the fourth objective is closely related to praxis, as it embeds the aim of supporting practitioners by identifying concrete methods and tools for involvement of the demand in innovation processes in services.

Table 2 depicts the research objectives and research questions as associated to the five papers, which constitute the main body of this dissertation (Part II). In the table, theoretical foundation, analytical and empirical approaches are also listed. In the next section of this synopsis, I outline the theoretical background this dissertation is grounded upon, and discuss in more detail the theoretical background and research gaps, based on which research objectives and research questions have been developed. The methodology section, on the other hand, describes the approach through which the research objectives were investigated.

Table 2: Overview of the papers that compose this dissertation.

Paper number and title (reference)	Research objective	Research question	Theoretical foundation	Analytical approach	Empirical foundation
Paper 1: Value co-creation and business model innovation in services (Nardelli, 2014b).	RO1: To investigate the unfolding of value co-creation throughout processes of open business model innovation in the service context.	How does value co-creation unfold throughout open business model innovation processes within the context of facility services?	Open innovation; service-dominant logic; business model innovation.	Qualitative; abductive; process approach.	Explorative study (combination of 14 semi-structured interviews and archive data); 3 mini case studies (8 in-depth, semi-structured interviews).
Paper 2: Stakeholder dialectics and innovation in services: A process perspective (Nardelli, 2014a).	RO2: To investigate the unfolding of tensions and potential conflicts between heterogeneous stakeholders throughout processes of innovation in the service context.	How and why do tensions and potential conflicts between heterogeneous stakeholders unfold during processes of innovation in services?	Innovation processes in services.	Qualitative; inductive; process approach.	Explorative study (combination of 14 semi-structured interviews and archive data); embedded case study based on combination of archive data with 8 in-depth, semi-structured interviews.
Paper 3: The interactions between innovation in services and ICT: A conceptual typology (Nardelli, 2015).	RO3: To investigate the relationship between innovation in services and ICT.	How can the relationship between ICT and innovation in services be defined and conceptualised according to existing literature?	Management of information and communication technologies (ICT); innovation in services.	Concept-centric literature review; variance approach.	45 academic articles.
Paper 4: Involving users in complex service systems' innovation processes by means of ICT-based tools: The case of Facility Management Services (Nardelli and Scupola, 2013).	RO3: To investigate the relationship between innovation in services and ICT. RO4: To investigate the proactive involvement of heterogeneous stakeholders, and related support tools, throughout innovation processes in the service context.	How can users be involved in the different stages of the open innovation processes of complex FM services by means of ICT-based tools?	Management of innovation in services; user involvement in innovation processes; management of innovation in FM services.	Qualitative; deductive; process approach.	Combination of 23 explorative, semi-structured interviews; archive data; and 4 in-depth interviews.
Paper 5: Facilities management innovation in public-private collaborations: Danish ESCO projects (Nardelli, Jensen and Nielsen, 2015).	RO4: To investigate the proactive involvement of heterogeneous stakeholders, and related support tools, throughout innovation processes in the service context.	How do internal FM units navigate and manage the collaboration of different, intra- and inter-organisational actors when innovating throughout ESCO collaborations?	Innovation processes in services; management of innovation in FM services; collaborative innovation in the public sector; FM value network.	Qualitative; deductive; process approach.	Multiple case study (10 cases) based on 17 semi-structured, in-depth interviews.

Structure

This dissertation is divided in two parts:

1. Part I introduces the research area and presents an overall summary of the work that I carried out for the Ph.D. project;
2. Part II presents the individual papers, which constitute the main body of the dissertation.

In the remaining of Part I, the theoretical background (1) presents the definition of the concepts that are used in this dissertation; (2) depicts the theoretical grounds of this research; and (3) outlines the research and theory gaps, which are tackled in Part II. The following section is dedicated to the empirical field of investigation, i.e., FM services. Here, I depict the nature and characteristics of the field, and define it as part of the broader context of the service industries. In the methodology I outline the ontological assumptions that guided my research, along with the epistemological approach, research design and methods for data collection and analysis. Finally, I depict and discuss the outcomes of my research by comparing them with existing literature, and draw the overall conclusion of the dissertation and Ph.D. project.

THEORETICAL BACKGROUND

In this section, I outline the theoretical foundations of the dissertation, i.e., the general theoretical background, within which the papers in Part II contribute to literature and theory. This section is divided into two parts. Firstly, I introduce the definition of the concepts, which are used in the dissertation, as related to (1) innovation; (2) service context; and (3) innovation in the service context, or innovation in services. Secondly, I depict the theoretical foundations of the dissertation, by reviewing the literature on the management of innovation, in general and with emphasis on the service context.

Innovation: definition of concepts

Economic phenomena take place in continuously changing settings, and economic actors operate in unpredictable environment that they do not fully understand (Nelson, 1955). Economic systems have steady states at times, but operate in a dynamic picture and are affected by a constant flow of changes. In this perspective, firms are historical entities, which acquire *imperfect* technological and organisational knowledge through trail-and-error learning, and seek profit through *innovation* (Nelson & Winter, 1982). Such innovativeness drives competition and needs to be continuously sought to overcome competitors (Fagerberg, 2006). Looking at the economic environment in this realistic light, scholars have tried to achieve a better understanding of the dynamics of the economy, and focused their research on the link between innovation and competition (Nelson, 1955). In the 1960s, studies on innovation turned into a separate field: while economists focused on the allocation of resources to innovation, cognitive scientists started investigating new product development and related processes (Fagerberg, 2006). This dissertation is built upon, and wishes to contribute to, the latter stream, as this work is dedicated to the study of management of innovation processes.

Innovation is commonly associated with a disruptive change, however small it may be, in an established landscape (i.e., *innovation outcome*) that is achieved through a process of development, implementation and launch of an invention (i.e., *innovation process*) (Crossan & Apaydin, 2010; Sundbo, 1997; Toivonen & Tuominen, 2009). What distinguishes innovation from change is the economic impact on its surrounding environment (Kline & Rosenberg, 1986). In other words, innovation brings benefit, in terms of economic return, to its developer(s), through the added value that it provides to the its receiver(s) and other stakeholders (Sundbo, 1997).

Grounded in existing research and especially drawing inspiration from Crossan and Apaydin (2010), innovation is here defined as the processes and outcomes related to:

1. Production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres;

2. Renewal and enlargement of products, services, and markets;
3. Development of new methods of production;
4. Establishment of new management systems and new business models.

The diffusion of innovation is excluded from such definition, as it refers to a process that takes place after innovation has already occurred and thus falls beyond the scope of this dissertation. This definition is applied to this study because it captures several important aspects of innovation:

- It includes both internally conceived and externally adopted innovation (*production* or *adoption*);
- It highlights innovation as more than a creative process, by including application (*exploitation*);
- It emphasises intended benefits (*value*) at one or more levels of analysis;
- It leaves open the possibility that innovation may refer to *relative novelty* of an innovation (an innovation may be common practice in other organisations but it would still be considered as innovation if it is new to the unit under research);
- It draws attention to the two roles of innovation (process and outcome) (Crossan & Apaydin, 2010, p. 1155).

In practice, this definition includes various innovation outcomes, whose categorisation can be found in existing literature. Firstly, innovation outcomes might be classified by type: (1) the introduction of a new offering (or quality thereof); (2) the introduction of a new method of production and/or commercialisation; (3) the opening of a new market; (4) the achievement of a new source of supply; (5) the establishment of a new organisation (Fagerberg, 2006). Furthermore, scholars have recognised the importance of *technological* and *organisational innovation* (Damanpour, Walker, & Avellaneda, 2009), the first being related to new types of machinery and other technical tools (e.g., Cainelli, Evangelista, & Savona, 2005; Evangelista, 2000; Garcia & Calantone, 2002; Jetter, Satzger, & Neus, 2008), the second to new ways of organising work (e.g., Damanpour et al., 2009; Damanpour, 1991; Hage, 1999; Kimberly & Evanisko, 1981), as well as of *business model innovation*, i.e., referring to the ways organisations create, deliver and capture value (e.g., Achtenhagen et al., 2013; Demil & Lecocq, 2010; Hedman & Kalling, 2003; Osterwalder & Pigneur, 2010).

Secondly, innovation outcomes might interest a (1) product and/or (2) a process, leading respectively to modular and architectural innovation. While the first is defined as the occurrence of new or improved goods or services (*product innovation*), the second concerns improvements in the ways these offerings are produced (*process innovation*) (Henderson & Clark, 1990).

Thirdly, different types of innovation might be classified by their degree of radicalness, which depends on the combination between newness and diversity that characterises the new

product or process (Freeman & Soete, 1997). In other words, *incremental innovations* introduce marginal changes into the existing set-up, whereas *radical innovations* are significantly new as compared to existing products or processes (Abernathy & Utterback, 1978). *Revolutionary innovation*, on the other hand, disrupts the existing state, and renders establish competences and knowledge obsolete (Abernathy & Clark, 1985). On the degree of innovation radicalness a specification is needed: Schumpeter, the father of innovation studies, only considered as proper innovations those new products or processes, which would introduce radical change into the system (Fagerberg, 2006). Nonetheless, contemporary scholars also accept incremental improvements as innovations (see, e.g., Damanpour et al., 2009; Gallouj & Weinstein, 1997; Hage, 1999; Johne & Storey, 1998; Reilly & Tushman, 2004).

Finally, the context, in which new or improved product and processes are launched, has an impact on the definition of innovation as such: a new idea might be considered new to the individual adopter, to an organisational sub-unit, to the organisation as a whole, or to the entire sector, industry, or organisational population (Damanpour et al., 2009). In this dissertation, I tackle the management of innovation at the firm level, and thus follow the approach adopted by Damanpour and colleagues, thereby defining innovation as *new to the actual recipient* (Damanpour et al., 2009).

The service context: definition of concepts

As the importance of services in the economy increased throughout the years, also research on the service context significantly developed. Despite the many available conceptualisations of the term *service*, no single definition seems to be able to encompass the full diversity and complexity of attributes that characterises service offerings and processes (Cook, Goh, & Chung, 1999). For instance, services have been defined as:

1. Deeds, acts, or performances that involve (1) tangible actions to people's bodies; (2) tangible actions to goods or other physical possessions; (3) intangible actions directed at people's mind; and (4) intangible actions directed at people's intangible assets (Lovelock, 1983);
2. An activity, or series of activities, of more or less intangible nature that normally, but not necessarily, take place in interactions between the customer and service employees and/or physical resources and /or systems of the service provider, and are provided as solutions for customer problems (Grönroos, 1990);
3. The application of specialised competences (knowledge and skills) through deeds, processes, and performances, for the benefit of another entity or the entity itself (Vargo & Lusch, 2004);

4. A time-perishable, intangible experience performed for a customer acting in the role of co-producer (Fitzsimmons & Fitzsimmons, 2006);
5. Any act or performance that one party can offer to another that is essentially intangible and does not result in the ownership of anything (Kotler, 2007);
6. The result of a production activity that changes the conditions of the consuming units, or facilitates the exchange of products or financial assets (Martinsson, 2012).

Despite being varied, all definitions share a common theme of intangibility and simultaneity of production and consumption during the service process (Fitzsimmons & Fitzsimmons, 2006). In this dissertation, I adopt a combination of the depicted definitions as follows:

> *Definition of service: A service is the application of specialised competences (knowledge and skills) through deeds, processes, and performances that result in an intangible offering for the benefit of another entity or the entity itself. Unlike physical goods, services are dynamic and unfold over a period of time through a sequence or constellation of events and steps.*

More specifically, the chain or constellation of activities that allows the service outcome, or offering, to function effectively is identified with the construct *service process* (Bitner et al., 2008; Gallouj & Savona, 2008; Wemmerlöv, 1990). Scholars of marketing, operations, and computer science use the construct *service system* to refer to the combination of activities and tasks that is at the basis of the understanding, analysis and design of services (Alter, 2008b). In this dissertation, the construct *service system* is only used in paper 4, for which Alter's (2008) definition was adopted. Services, in addition, are characterized by: (a) intangibility; (b) simultaneous production and consumption; (c) heterogeneity; and (d) perishability (Fitzsimmons & Fitzsimmons, 2006). The *service outcome* is thus defined as the intangible, simultaneous, heterogeneous and perishable offering that involves receivers' participation and generates benefit for the receivers by improving—one way or the other—their existing state (Grönroos, 1990; Kotler, 2007; Lovelock, 1983; Vargo & Lusch, 2004). Table 3 outlines the definitions of the four characteristics, whose unique combinations characterise different services (Fitzsimmons & Fitzsimmons, 2006; Jong, Bruins, Dolfsma, & Meijaard, 2003).

Table 3: Characteristics of services.

Characteristic	Definition	References
Intangibility	Although services are often associated to certain physical elements, for most part customers risk buying an outcome and/or experience that they cannot fully assess its value due to its intangibility. Nonetheless, a tangible representation of the service usually accompanies its commercialisation to make it less abstract for customers.	(E.g., de Brentani, 1991; Johne & Storey, 1998; Jong et al., 2003; Kotler, 2007)
Simultaneity of production and consumption	Services are produced and consumed at the same time and in the presence of customers, or require substantial interaction between providers and customers. The degree of overlap between production and consumption varies according to the service: the more the overlap, the greater the interaction, and, as a consequence, the higher the complexity of managing the service process and outcome.	(E.g., Cooper & de Brentani, 1991; de Brentani, 1991; Johne & Storey, 1998; Jong et al., 2003)
Heterogeneity	Services are variable, i.e., they can be easily customised and differentiated, especially if the service outcome is people-based: each individual will add a personal touch to the provision, making the same offering varied. In addition the perception of customers is personal, which adds to the heterogeneity of service offerings in the eyes of the demand.	(E.g., de Brentani, 1989, 1991; Jong et al., 2003; Kotler, 2007)
Perishability	Services that are being provided but not consumed cannot be stored. Production and consumption of services, in fact, are bound to the time and place and are closely interrelated with the presence of the customer. Not all services cannot be stored (ICT-based services, for instance, are not always perishable); but when services are perishable, it is necessary to synchronise demand and supply.	(E.g., de Brentani, 1989; Johne & Storey, 1998; Jong et al., 2003)

Nonetheless, the use of such characteristics to define services has been criticised for being too reductive. Johne and Storey (1998), for instance, suggest considering tangible goods and services as the extremes of a continuum, on which the characteristics in Table 3 show themselves in different combinations and to an increasing degree. The service-dominant logic, on the other hand, claims the emergence of a new paradigm in the developed economies, and proposes service providing as the fundamental basis for economic exchanges (Vargo & Lusch, 2004). Such proposal is grounded in the argument that there is no actual difference between tangible goods and services, if both are seen in the light of service-based offerings (Vargo & Lusch, 2004, 2007). Therefore, Vargo and Lusch (2004, 2007) stress that a definition of services centred around the four characteristics depicted in Table 3 is misleading, as it only has meaning in a manufacturing perspective.

I acknowledge the critique by Vargo and Lusch (2004, 2007), as well as the perspective of the service-dominant logic, which is actually part of the theoretical grounds of one of the articles in this dissertation, i.e., paper 1. However, I here follow Johne and Storey's (1998) suggestion and consider manufactured goods and services on two ends of a continuum to focus on the service offerings, i.e., the more intangible end of the continuum. This approach is closely related with the decision to adopt the synthesis perspective to investigate innovation in services, as described below. In fact, both Johne and Storey's (1998) approach and synthesis perspective incorporate the characteristics of services in the investigation of innovation in the service context, yet do not disregard the theories on innovation within manufacturing that are relevant also for intangible offerings.

Innovation in services: definition of concepts

As innovation in manufacturing, innovation in services is essentially about change and renewal (Jong et al., 2003). Nonetheless, because of the characteristics of services, theories on innovation in the manufacturing context have been shown to not be fully applicable to the service environment (e.g., Bryson et al., 2012; Coombs & Miles, 2000; Gallouj & Savona, 2008). At first, however, scholars argued for services being just another offering fully comparable with tangible goods (e.g., Cooper & de Brentani, 1991; Evangelista & Savona, 2003; Evangelista, 2000; Menor, Tatikonda, & Sampson, 2002; Miozzo & Soete, 2001; Scheuing & Johnson, 1989; Tidd, Pavitt, & Bessant, 2001). Research within the so-called *assimilation*—or technologist—approach, therefore, attempted to assimilate services within the consolidated framework used for manufacturing and technological sectors. Such approach was based on the argument that innovation in services is primarily driven by the adoption of technologies and capital equipment, with non-technological innovation being present but marginal (Gallouj & Savona, 2008). Scholars (e.g., Evangelista & Savona, 2003; Evangelista, 2000; Miozzo & Soete, 2001; Soete & Miozzo, 1989) drew inspiration from Pavitt's taxonomy of innovation (Pavitt, 1984) to classify innovation in the service context. While this work has been criticised for being reductive (Djellal & Gallouj, 1999), it has shown how innovation in service include non-technological as well as technological traits and processes.

Within the assimilation approach, as reported by Bryson et al. (2012), three fundamental differences were outlined, which argued for non-compatibility of goods-derived theories to the service context (e.g., Cooper & Edgett, 2008; Gallouj, 2002):

1. Innovation in services requires simultaneous innovation in products and processes, meaning that the differentiation between product and process innovation is less accentuated in the service context;

2. There is no actual separation between product innovation and organisational innovation in services;
3. There is no distinction between the creation of a new service offering and its implementation and commercialisation (Callon, Laredo and Rabeha, 1997 in Bryson et al., 2012).

This led to the development of a *differentiation*—or service-oriented—approach to innovation that treated innovation in services as an independent phenomenon. The differentiation approach required theories and literature that would emphasise the complex process based on non-technological drivers that was presented as typical of services (Cooper & Edgett, 2008; Gago & Rubalcaba, 2006; Howells, 2001). Barras (1986, 1990) adopted the industry life-cycle framework by Abernathy and Utterback (1978) to develop a dynamic model of innovation in services, i.e., the reverse product cycle model. According to his model, information and communication technologies (ICT) are the enabling technology that, when adopted by service sectors, accounts for their innovation potential (Barras, 1986, 1990). Barras' work, however, was criticised for building only on the technological characteristics of innovation, thereby underestimating the non-technological innovation that takes place in the service industries (Gallouj & Weinstein, 1997).

As a consequence, scholars that adopted the differentiation approach rejected the typologies and characterisations previously developed, and stressed (1) fuzziness and (2) interactivity of the process, as well as (3) subjectivity of perceptions of the outcome that characterises services and innovation within such context (e.g., Djellal & Gallouj, 1999; Edvardsson & Olsson, 1996; Gadrey & Gallouj, 1998; Gallouj & Savona, 2008). In this view, not only does a service not have an autonomous existence defined by its technical specifications, but also it is consumed while it is produced, meaning that the customer might and in fact should be involved in the production and in the innovation process (Djellal & Gallouj, 1999). Also, the service context is extremely diverse, and so are service customers and their perceptions. This implies that each service and service innovation might be interpreted in a different way by each individual customer, hence the heterogeneity of services (e.g., Edvardsson & Olsson, 1996). The innovation process in the service context was therefore recognised as a complex process based on both technological and non-technological drivers (Gago & Rubalcaba, 2006; Howells, 2001).

Based on these arguments, differentiation-oriented scholars proposed typologies of innovations that were specifically derived within the service context (e.g., Djellal & Gallouj, 1999; Gadrey & Gallouj, 1998). Gadrey and Gallouj (1998), for instance, distinguished between (1) *ad hoc* innovation, i.e., unique solutions, co-produced specifically to address a customer's problem; (2) new expertise-field innovation, i.e., involving new knowledge and expertise that resolves in opening of new markets, diversification or renewal of existing offering, and creation of competitive advantage; (3) formalisation innovation, i.e., centred on mechanisms that would

reduce the fuzziness and intangibility of the service output. Such typologies have been recognised to represent a significant step forward towards the identification of non-technology trajectories and innovation performance in the service context (den Hertog, 2000; e.g., Gallouj & Savona, 2008). Nonetheless, the differentiation approach has been criticised for not being rich enough, thereby failing to incorporate the full breadth of innovation in services (e.g., de Vries, 2006; den Hertog, 2000; Gallouj & Savona, 2008; Gallouj & Weinstein, 1997; Windrum & Garcıa-Goni, 2008).

A *synthesis*—or integrative—approach has thus been proposed, with the aim of taking into consideration the emerging process of convergence between tangible goods and services (Bryson et al., 2012; Gallouj & Savona, 2008; Gallouj & Windrum, 2008). The synthesis approach is not limited to being an intermediate point between the assimilation and differentiation perspectives, but it rather involves exploring new ways of thinking about services as making important contribution to economic and social life (Bryson et al., 2012). In fact, a clear cut between tangible goods and services would not allow investigating innovation in its integrity (Bryson et al., 2012; Carlborg, Kindström, & Kowalkowski, 2014; Toivonen & Tuominen, 2009). Manufacturing and service activities should thus be considered in a more integrative light (Drejer, 2004; Hipp & Grupp, 2005), borrowing from each other and allowing for multi-dimension and multi-disciplinary research (Carlborg et al., 2014). In other words, the synthesis approach combines the assimilation and differentiation approaches and considers innovation in services in its integrity, by including both technological and non-technological aspects, as well as all different types and degrees of innovation.

The characteristics-based approach by Gallouj and Weinstein (1997) represents one of the first steps towards the synthesis perspective. In fact, it depicts innovation in services as a complex process rather than an outcome, and proposes a model, in which technological and non-technological aspects of innovation in services are grouped into three sets of characteristics:

1. Final or service characteristics: describe the utility, i.e., the benefit, that is linked to the service provided to the customer;
2. Technical characteristics: describe the organisation's tangible and intangible systems (including processes) that are used to provide the service;
3. Competence characteristics: relate to the individual skills of both the service provider and the customer that relate to each other during the innovation process (Gallouj & Weinstein, 1997).

Based on the different combinations of these three groups of characteristics, Gallouj and Weinstein (1997) distinguished between six types of innovation in services, as depicted in Table 4.

Table 4: Types of innovation in services (Adapted from Gallouj and Weinstein, 1997).

Types of innovation in services	Definition
Radical innovation	In the new service, a totally new system of final, technical, and competence characteristics replaces the old one.
Improvement innovation	In the new service, improving technical or competence characteristics increases the value of the final characteristics.
Innovation by addition or substitution	In the new service, one or more new elements are added or subtracted to the technical characteristics, which in turn generates an adjustment in the final and competence characteristics.
Architectural innovation	In the new service, the characteristics of two or more services are combined to create value, or an existing service is split into new services.
Formalization innovation	In the new service, the relationship between technical and final characteristics is made more formal to increase reproducibility.
***Ad hoc* innovation**	The new service is developed in response to a specific request or need by the client.

Several attempts have been made to operationalize and further develop the characteristics-based approach by Gallouj and Weinstein (see, e.g., de Vries, 2006; Windrum & Garcıa-Goni, 2008). Den Hertog (2000), for instance, has tried to develop a comprehensive model to conceptualise what he defines as innovation in services, i.e., *change in the service offering and/or related processes of distribution, client interaction, quality control and so on*. Den Hertog's (2000) model includes four dimensions of innovation in services, as visualised in Figure 1: (1) new service concept; (2) new client interface; (3) new service delivery system; (4) technological options. Every innovation in the service context, according to this perspective, consists of a combination of these dimensions and relative degrees. This implies that when talking about innovation in services, we do not only refer to new services, but also to new organisational settings, processes and technologies, which allow the service provision (Drejer, 2004).

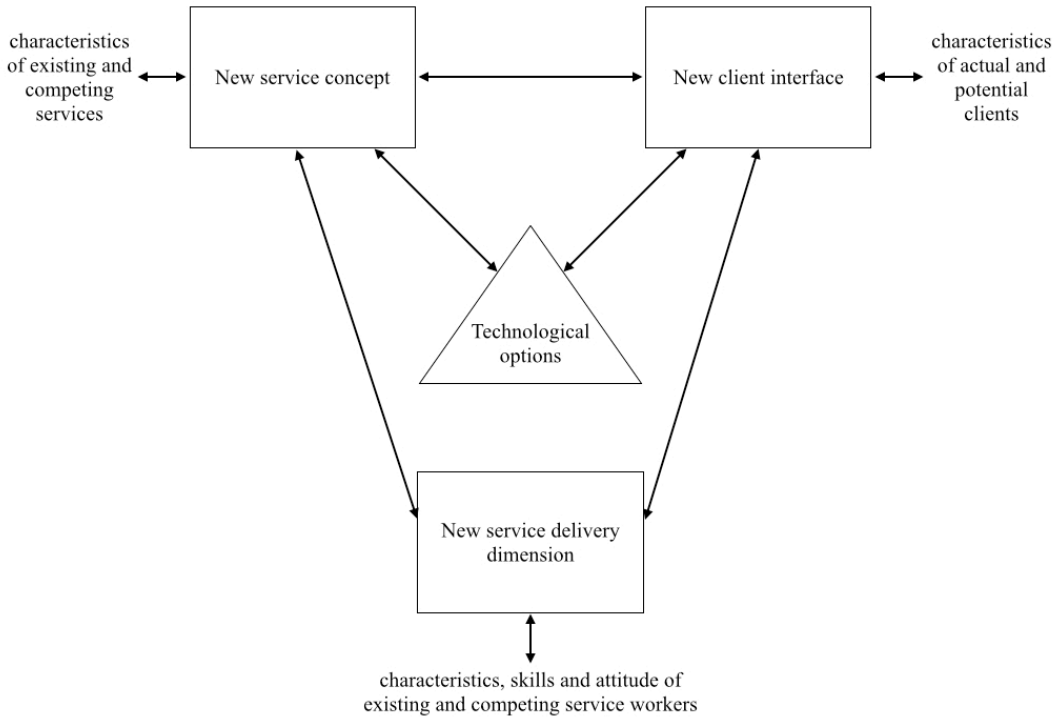

Figure 1: Dimensions of innovation in services (adapted from den Hertog, 2000).

In addition, services have been found to play an emerging role in the development of new ways of organising the production of goods, services and hybrids, as well as of new business models, calling for further research within the synthesis approach (Bryson et al., 2012). More specifically, innovation in services has been defined as being multi-dimensional, thereby concerning issues such as strategy and policy issues, as well as technology, organisation and business models (e.g., Amara, Landry, & Doloreux, 2009; Hertog et al., 2010; Maglio & Spohrer, 2007; Rubalcaba, Gallego, & Hertog, 2010; Spohrer & Maglio, 2008; Toivonen & Tuominen, 2009). This explains why, in this dissertation, I choose to use the construct *innovation in services* rather than *service innovation*, as the first includes not only innovation in the service offerings and related processes, but also in the organisation and business model behind them. Innovation in service is thus broadly defined as all types of innovation that take place in service firms, sectors and industries, as inspired by Miles and Tether (2003).

To summarise, in Figure 2 I visualised the evolution of the research on innovation in services from the assimilation to the synthesis approach, along with some of the most significant references for each perspective. Please notice that the arrow does not correspond with actual time, as the perspectives chronologically overlap, but it is rather meant to represent the development of literature and theories on innovation within the service context.

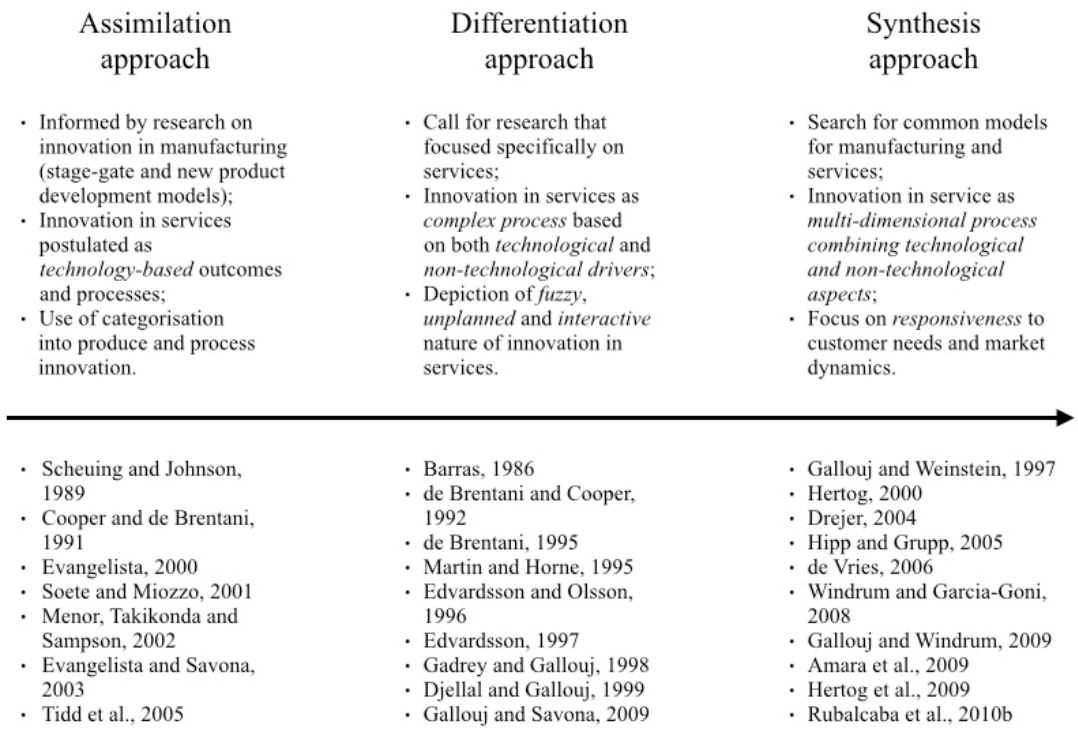

Figure 2: Evolution of the literature on innovation in services.

Definition of concepts: summary

To systematically summarise what was outlined in this first part of the theoretical background, Table 5 reports the definitions derived from existing literature on innovation, services and innovation in services that are applied in this dissertation. The table also includes the definition of the different types of innovation within the service context that are touched upon in this dissertation. In the light of the synthesis approach, such definitions were derived by combining the types of innovation that were conceptualised by innovation studies on manufacturing and those identified by research dedicated to the service context. The references marked with an asterisk are those related to the investigation of innovation in the service context specifically.

Table 5: Definition of the main concepts.

Concept	Definition	References
Innovation process	Process that starts with the generation of the idea and ensures the development, implementation and launch of an innovation outcome.	(Crossan & Apaydin, 2010; Sundbo, 1997*; Toivonen & Tuominen, 2009*)
Innovation outcome	Disruptive change in the established landscape of the receiver, which bring an economic benefit to its developer(s) through the added value provided to the receiver.	(Crossan & Apaydin, 2010; Damanpour et al., 2009; Fagerberg, 2006; Kline & Rosenberg, 1986)
Technological innovation	Innovations that embody inventions from the industrial arts, engineering, applied sciences and/or pure sciences.	(Cainelli et al., 2005; Evangelista, 2000; Garcia & Calantone, 2002; Jetter et al., 2008)
Organisational innovation	New ways of organising work.	(Damanpour et al., 2009; Damanpour, 1991; Hage, 1999; Kimberly & Evanisko, 1981)
Business model innovation	New ways of creating, delivering and capturing value.	(Achtenhagen et al., 2013; Demil & Lecocq, 2010; Hedman & Kalling, 2003; Osterwalder & Pigneur, 2010)
Product innovation	New (or improved) good and/or service offerings.	(Fagerberg, 2006; Henderson & Clark, 1990)
Process innovation	New (or improved) ways for producing/providing goods and/or service offerings.	(Fagerberg, 2006; Henderson & Clark, 1990)
Radical innovation	Significantly new products or processes as compared to the existing state.	(Abernathy & Utterback, 1978; Freeman & Soete, 1997)
Incremental innovation	Marginal change/improvement of products or processes in the existing set-up.	
Revolutionary innovation	Changes that disrupt the existing state, and renders establish competences and knowledge obsolete.	(Abernathy & Clark, 1985)
Service	The application of specialised competences (knowledge and skills) through deeds, processes, and performances that result in an intangible offering for the benefit of another entity or the entity itself.	(Fitzsimmons & Fitzsimmons, 2006*; Grönroos, 1990*; Kotler, 2007*; Lovelock, 1983*; Vargo & Lusch, 2004*)
Service outcome/offering	Intangible, simultaneous, heterogeneous and perishable offering that involves receivers' participation and generates benefit for the receivers by improving one way or the other their existing state.	(Fitzsimmons & Fitzsimmons, 2006*; Grönroos, 1990*; Kotler, 2007*; Lovelock, 1983*; Vargo & Lusch, 2004*)

Service process	Chain or constellation of activities that allows the service outcome, or offering, to function effectively.	(Bitner et al., 2008*; Wemmerlöv, 1990*)
Service system	Combinations of activities that compose a service outcome and are therefore at the basis of the understanding, analysis and design of services.	(Alter, 2008a*, 2008b*; Ferrario & Guarino, 2009*; Maglio, Kieliszewski, & Spohrer, 2010*)
Service innovation	Development, implementation and commercialisation of new or improved service offerings (i.e., innovation in the service offering), and organisational processes behind them (i.e., innovation in the service delivery).	(Bryson et al., 2012*; Sundbo, 1997*; Toivonen & Tuominen, 2009*)
Innovation in services	Development and implementation of: (1) new or improved service offerings (i.e., innovation in the service offering(s)); (2) new or improved organisational process behind a service offering (i.e., innovation in the service delivery); (3) new or improved organisation (structure or process) behind service offering(s) and related provision (i.e., organisational innovation); (4) new or improved technological tools behind service offering(s) and related provision (i.e., technology innovation); (5) new or improved business model behind service offering(s) and related delivery (i.e., business model innovation).	(Bryson et al., 2012*; den Hertog, 2000*; Jong et al., 2003*; Miles & Tether, 2003*)
Innovation in the service offering	Development and implementation of new or improved service offering(s).	(den Hertog, 2000*; Drejer, 2004*; Forsman & Rantanen, 2011*; Forsman, 2011*; Gallouj & Weinstein, 1997*; Hertog, Gallouj, & Segers, 2011*; Sundbo, 1997*)
Innovation in the service delivery	Development and implementation of new or improved organisational process behind provision of service offering(s).	
Organisational innovation in services	Development and implementation of new or improved organisation (structure or process) behind service offering(s) and related provision.	(Atilgan-Inan, Büyükküpçü, & Akinci, 2010; Damanpour et al., 2009; Damanpour, 1991; Fagerberg, 2006; Hage, 1999; Jong et al., 2003*; Kimberly & Evanisko, 1981)
Technological innovation in services	Development and implementation of new or improved technological tools behind service offering(s) and related provision. Please notice that in paper 3 this type of innovation is referred to as *technology innovation in services*.	(Barras, 1986*, 1990*; Cainelli et al., 2005; Damanpour et al., 2009; Evangelista, 2000; Fagerberg, 2006; Garcia & Calantone, 2002; Jetter et al., 2008; Jong et al., 2003*; Popoli & Popoli, 2009*; Targowski, 2009*)
Business model innovation in services	Development and implementation of new or improved business model behind service offering(s) and related delivery.	(Achtenhagen et al., 2013; Amit & Zott, 2001, 2012; Bryson et al., 2012*; Chesbrough & Rosenbloom, 2002; Demil & Lecocq, 2010; Hedman & Kalling, 2003; Osterwalder & Pigneur, 2010; Sanchez & Ricart, 2010)

Management of innovation in the service context: theoretical foundations

Since this dissertation is centred around the management of innovation within the service context, with emphasis on the interactions between stakeholders, I built my research upon—and aim at contributing to—existing literature and theories that focus on the service industries. Nevertheless, to ensure a sound foundation for my work I had to start where research on innovation in services found its roots, i.e., in the more generic literature on the management of innovation outcomes and processes. In this part of the theoretical background I review existing research on the management of innovation, and, in the light of the synthesis approach, I combine and compare the literature and theories on both tangible goods and services. Moreover, I point out the gaps in existing research that I targeted in the papers in Part II of this dissertation. Please notice that a section specifically dedicated to the theoretical contributions of the dissertation in general and of each individual paper can be found in the final section of Part I (*Results, Discussion and Conclusions*).

To categorise the broad range of research on the management of innovation, and review it systematically, I distinguish between variance and process studies, which correspond to two main approaches for the investigation of change and innovation (Langley, 1999; Pettigrew, 1997; Van de Ven & Poole, 2005).

Management of innovation: variance and process studies

Variance studies seek explanation of change as driven by deterministic causation, with independent variables acting upon and causing changes in dependent variables. In other words, variance research aims at establishing the conditions necessary to bring about an outcome, by treating change as a variable, e.g., rate of innovation or depth of change, or as the context for other causal processes (Pettigrew, 1997; Van de Ven & Poole, 2005).

Scholars, who applied the *variance approach* to study innovation, have first of all focused on investigating the role that innovation might or might not play with regards to innovation performance, and developed management tools to measure such impact, such as, for instance, customer satisfaction, speed to market, revenue growth and so on (see, e.g., Adams, Bessant, & Phelps, 2006; Armbruster, Bikfalvi, Kinkel, & Lay, 2008; Cooper & Kleinschmidt, 1987; Cooper, 1984; Garcia & Calantone, 2002; Hagedoorn & Cloodt, 2003; Hultink & Robben, 1995; Kimberly & Evanisko, 1981; Sirilli, 1998; Tidd, 2001). To better understand how to possibly manage innovation so as to maximise its performance, researchers then turned to the factors that impact on the success of new offerings, technologies, organisational forms and business models (see, e.g., Cooper & Kleinschmidt, 1995, 1996; Gambardella & McGahan, 2010; Gilbert & Cordey-Hayes, 1996; Johne & Snelson, 1988; Koen, Bertels, & Elsum, 2011; Teece, 1986). Table 6 summarises the main factors that scholars have identified as having a relevant impact on each type of innovation.

Table 6: Influencing factors and types of innovation.

Type of innovation	Influencing/driving factors	References
Product innovation	New product development process: (1) proficiency of activities; (2) market orientation; (3) customer orientation.	(Brown & Eisenhardt, 1995; Cooper & Kleinschmidt, 1995, 1996; Cooper, 1994; Ernst, 2002; Johne & Snelson, 1988)
	Organisation: (1) heterogeneity of project team; (2) skills and abilities of project leader; (3) autonomy and responsibilities of project team; (4) commitment of leadership; (5) quality and intensity of communication; (6) structure of the organisation.	
	Culture: (1) entrepreneurial climate; (2) product champions.	
	Role and commitment of senior management.	
	Strategy: (1) clear objectives; (2) strategic focus; (3) long term thrust.	
Technological innovation	Appropriability regimes: (1) nature of technology; (2) efficacy of legal mechanisms of protection.	(Gilbert & Cordey-Hayes, 1996; Howell & Higgins, 1990; Kimberly & Evanisko, 1981; Teece, 1986)
	Complementary assets: (1) generic assets, (2) specialised assets; (3) co-specialised assets.	
	Dominant design (achievement of standards).	
	Core learning routines: (1) acquisition; (2) communication; (3) application; (4) assimilation.	
	Innovation champions: (1) leadership behaviour; (2) personality characteristics; (3) influence tactics.	
Organisational innovation	Innovation leadership: (1) values and personalities; (2) technical and professional expertise; (3) leadership and management skills.	(Crossan & Apaydin, 2010; Damanpour & Evan, 1984; Damanpour, 1991; Hage, 1999; Kimberly & Evanisko, 1981; Lam, 2006)
	Managerial levels: (1) mission, goals and strategy; (2) internal and external structure and systems; (3) resource allocation and division of labour; (4) organisational learning and knowledge management tools; (5) organisational culture.	
	Business processes: (1) initiation; (2) portfolio management; (3) development and implementation; (4) project management; (5) commercialisation.	
Business model innovation	Technology: existing, improved and/or radically new technologies.	(Gambardella & McGahan, 2010; Govindarajan & Trimble, 2011; Koen et al., 2011; Mitchell & Coles, 2004)
	Value network: structure of relationships with internal and external stakeholders.	
	Financial hurdle: relationship of a given project's financial projections to the minimal expected return.	

In sum, three groups of factors were shown to determine the success of innovation outcomes and related impact on the overall organisational performance: (1) inputs and resources (e.g., tangible and intangible assets, available technology, budget, organisational structure, innovation champions); (2) processes (e.g., development and business processes, learning routines); and (3) contextual contingencies (e.g., characteristics and dynamics of the market) (Kimberly & Evanisko, 1981; Tidd, 2001).

In services, the development of the variance approach followed a similar development: researchers first focused on investigating the role of innovation for service organisations (e.g., Djellal & Gallouj, 1999; Miles, 1999) and the economic performance of innovation in the service context (e.g., Cainelli, Evangelista, & Savona, 2004, 2006; Hipp & Grupp, 2005), to then turn to the effects of the service industries on the innovativeness and variety of innovation outcomes (e.g., Miles, 2008; Sundbo & Gallouj, 2000; Vence & Trigo, 2008). Scholars of innovation within the service context identified a set of driving factors for innovation success (Carlborg et al., 2014). First of all, technology was identified as a critical factor for innovation, thereby linking the emerging literature on innovation in services back to the one derived in a manufacturing-driven context (Chan, Go, & Pine, 1998; Drejer, 2004). Secondly, the involvement of customers emerged as playing a significant role in the management of innovation, both in terms of controlled customer participation (e.g., Alam, 2002) and customer interaction and learning (e.g., Matthing et al., 2004). Finally, with the emergence of the synthesis approach, scholars recognised that innovation in services is not only technological, but in fact involves also many non-technological aspects (e.g., Drejer, 2004; Hipp & Grupp, 2005). Factors such as leadership, strategy and management of processes were therefore pointed out as relevant drivers of innovation (e.g., Hull, 2004; Johne & Harborne, 2003). Based on these results, Tether (2005) carried out an empirical study using the European Innovation Barometer. Among the findings of such study, he pointed out five factors, which appear to impact on the success of innovation within the service contest:

1. Human factors, such as knowledge, skills and expertise of the staff;
2. Cooperation between service provider(s), customers and suppliers;
3. Flexibility/adaptability to the dynamics of the environment;
4. Process management and efficiency;
5. Technology advances (Tether, 2005).

This dissertation builds on the recognition of the impact of these factors on innovation in services, and contributes to existing research and theories by investigating specific aspects of the factors and combinations thereof. For instance, among the literature on the impact of technology (and innovation thereof) on innovation in services, scholars have recently dedicated extensive attention to the role of ICT (Tether & Tajar, 2008). In 2008, Tether and Tajar stressed how more and deeper knowledge on the interactions between innovation in services and ICT is still needed to

support a deeper understanding of innovation within the service context. Before and after their call, more and diverse research has been carried out, which highlights the role of ICT in (1) constituting an integral elements of the innovation in service offerings and related delivery (i.e., ICT as a product) (see, e.g., Beynon-Davies, 2005; Cocosila & Archer, 2010; Moller, Rajala, & Westerlund, 2008; Tuunainen, Tuunanen, & Piispanen, 2011; Williams, Graham, Jakobs, & Lyytinen, 2011) and (2) supporting the processes behind innovation in services (i.e., ICT as a special capital input) (see, e.g., Gago & Rubalcaba, 2006; Gambarotto & Cammozzo, 2010; Hidalgo Nuchera & López Rodríguez, 2008; Jetter et al., 2008; Kanstrup, Bjerge, & Kristensen, 2010; Lyytinen & Rose, 2003; Nylén & Holmström, 2011). While the availability of diverse research supports the development of new knowledge, the heterogeneity of existing literature might make it harder to identify critical un-investigated topics when planning and executing research on innovation in services and ICT (Nardelli, 2015). In paper 3, I carried out a systematic and structured literature review on the relationship between innovation in services and ICT, which contributes to existing research by organising the fragmented body of knowledge on the topic, while considering both sides of the connection. The conceptual typology that I derived from previous research, in fact, emphasises not only the impact of ICT on innovation in services, but also the effect that innovation has on ICT adoption, development and implementation.

Another factor presented as crucial for innovation by both manufacturing- and service-centred research is the management of innovation processes (Tether, 2005). In the case of product innovation, for instance, the proficiency in managing new product development processes, along with the constant orientation towards the market and the customers have been shows to play a crucial role for the impact that an innovation outcome might play on the organisational performance (e.g., Cooper & Kleinschmidt, 1995, 1996; Cooper, 1994). Similarly, the reviewed literature reveals the potential of learning routines and business processes to support respectively technological (e.g., Gilbert & Cordey-Hayes, 1996; Kimberly & Evanisko, 1981) and organisational innovation (e.g., Crossan & Apaydin, 2010; Hage, 1999), also specifically within the service context (e.g., Drejer, 2004; Hipp & Grupp, 2005; Hull, 2004; Johne & Harborne, 2003).

The crucial role played by processes in determining the impact of innovation on organisational performance, as well as the success of specific innovation outcomes, was picked up by *process studies* dedicated to the management of innovation, in general and in the service context. Typically, process approaches go beyond surface descriptions of change to penetrate the logic behind temporal progressions, and should identify the generative mechanisms that cause observed events to happen in the real world, and the related contingencies or circumstances (Langley, Smallman, Tsoukas, & Van de Ven, 2013; Pettigrew, 1997; Tsoukas & Hatch, 2001; Van de Ven & Poole, 2005). In the attempt to offer a comprehensive understanding of

organisational mechanisms, Van de Ven and Poole (1995) have proposed a typology of process theories (Figure 3), which integrates different perspectives on organisational change. They argue that all theories on organisational change and development can be built from one of the four basic modes of change (or a combination thereof): (1) life cycle; (2) teleological; (3) dialectic; and (4) evolutionary.

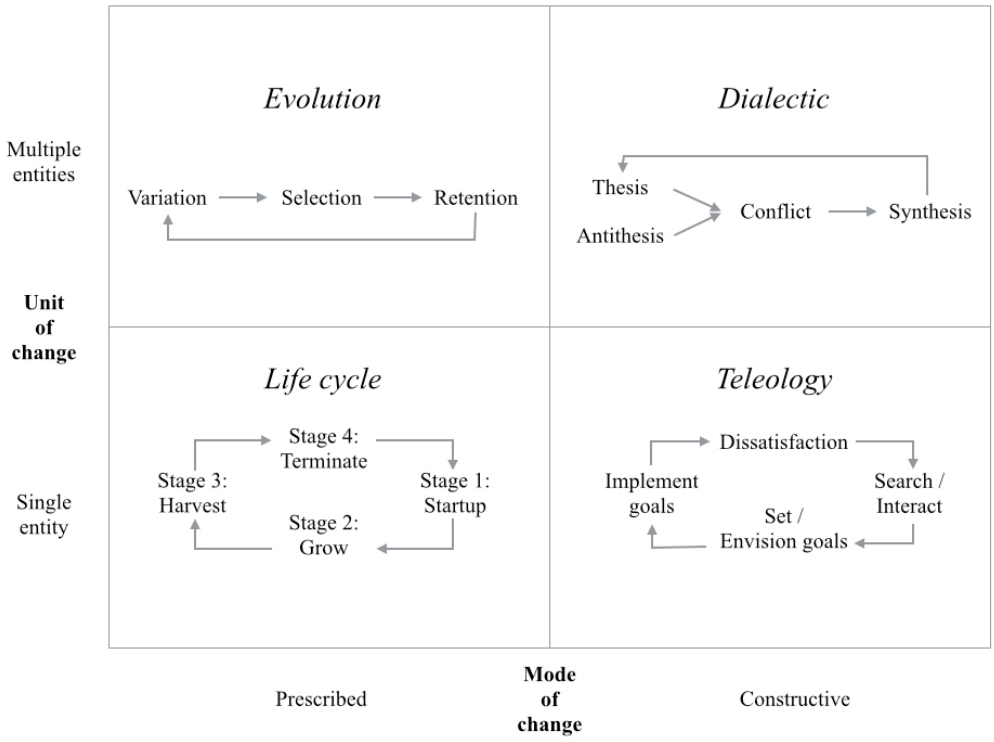

Figure 3: Typology of process theories (adapted from Van de Ven and Poole, 1995).

I here apply the typology in Figure 3 to the literature on the management of innovation processes that is related to the work I carried out throughout the Ph.D. project. More specifically, I use it to organise this last part of the theoretical background. Based on the typology, different streams of literature on the management of innovation processes can be classified based on two dimensions: (1) the unit of change, i.e., single or multiple entity/-ies; (2) the mode of change, i.e., prescribed or constructed, in the entity's/-ies' state.

The life-cycle motor of innovation

On one hand, a prescribed mode of change channels the development of entities in a pre-specified direction, typically of maintaining and incrementally adapting their forms in a stable, predictable way. In other words, prescribed change generates variations within an existing framework, and evokes a sequence of change events in a cord with a pre-established program or action routine (Van de Ven & Poole, 1995). When a single entity is affected by the change, Van de Ven and

Poole (1995) refer to a life cycle motor. The life-cycle motor associates (1) the development of organisational entities (organisations, products and processes) to (2) organic growth, from birth, i.e., initiation, to death, i.e., termination. For instance, Rogers (2010) proposed a model of innovation process in five sequential stages: (1) recognition of need; (2) research of the problem; (3) development of idea into useful concept; (4) commercialisation; (5) diffusion and adoption. Similarly, theories on new product development, grounded in the stage-gate model by Cooper and colleagues (Cooper & Kleinschmidt, 1987; see, e.g., Cooper, 1986, 1994) and in Booz, Allen and Hamilton's model (Booz, 1982), depicted innovation processes as life cycles. The two key phases of such processes, i.e., initiation and implementation cover five—or more, depending on the model—subsequent steps. The steps range from the screening of ideas through prototype development and testing to the pre- and post-commercialisation analyses (e.g., Atilgan-Inan et al., 2010; Calantone & Benedetto, 1988).

Drawing inspiration from new product development models, the majority of process studies on innovation in services (Nardelli, 2014a) postulate new service development processes that are structured in formalised steps and phases (see, e.g., Alam & Perry, 2002; Miles, 2008; Ottenbacher, Shaw, & Ermen, 2006; Scheuing & Johnson, 1989). Some of the studies on innovation in services, however, stress that the phases of new service development do not necessarily have to be sequential, but might be overlapping depending on the drivers of innovation and on the specific circumstances (e.g., Cardellino & Finch, 2006; Miles, Andersen, Boden, & Howells, 2000). Within the literature on new service development, moreover, scholars tackle the issue of involving customers in the innovation process of service offerings, while still focusing on one single unit of change (e.g., Abramovici & Bancel-Charensol, 2004; Alam, 2002, 2011, 2013; Bitner et al., 2008; Busse & Wallenburg, 2011; Johne & Storey, 1998; Kuusisto & Riepula, 2011; Melton & Hartline, 2010; Mota Pedrosa, 2012). Researchers have shown the potential of customer involvement as beneficial to innovation in services, and highlighted that customers can be involved through various methods for active and passive contribution throughout the various phases of new service development processes (e.g., Alam, 2002, 2011, 2013; Bitner et al., 2008).

Among the literature on the prescribed mode of change within innovation processes in services, the majority of studies have adopted a firm-centric perspective on the service providing organization (see, e.g., Alam, 2002, 2011, 2012, 2013; Bitner et al., 2008; Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011). As mentioned above, a more complete overview, which include the point of view of other stakeholders, is still missing (Nardelli, 2014a). Paper 4 finds its theoretical grounds in the literature on life-cycle innovation processes, and aims at contributing to a more complete understanding of the involvement of customers. The study, in fact, extends

beyond the firm-centric perspective that is typical of previous research to emphasise the various roles that all stakeholders come to plays in the innovation process of FM service offerings.

The evolutionary motor of innovation

When multiple entities are involved in prescribed change processes, the motor of change is defined as evolutionary. When the evolutionary motor drives innovation, the statistical accumulation of small individual events gradually modifies the nature of a larger population. As in biological evolution, evolutionary change in organisational contexts proceeds through continuous cycles of variation, selection and retention. These cycles are defined as prescribed because the probability of the changing demographic characteristics of the population can be specified through dedicated decision-making and implementation (Van de Ven & Poole, 1995). In organisation and management literature, evolutionary theories can depict changes in inter-organisational populations (Carroll & Hannan, 1989); intra-organisational entities (Burgelman, 1991); and even in the interactions between individuals (Weick, 1979). A stream of literature that presents the management of innovation as driven by a prescribed mode of change across multiple entities is open innovation. According to open innovation research, innovation processes are grounded in the controlled interaction between different organisations (see, e.g., Enkel, Gassmann, & Chesbrough, 2009; Gassmann & Enkel, 2004; Henkel, Schöberl, & Alexy, 2014). To be more specific, open innovation theories postulate that, to ensure survival and growth of organisations in a dynamic environment, innovation processes should be based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-pecuniary mechanisms (Chesbrough, Vanhaverbeke, & West, 2014). In other words, inter-organisational knowledge flows should be managed in a systematic and meaningful way and driven by carefully planned decision-making. Similarly, theories on collaborative innovation in the public sector depict innovation as led by the evolutionary motor. In fact, this stream of theories considers multiple units of change, i.e., the collaborating parties, who should operate as guided by a precise innovation agenda (i.e., prescribed mode of change). According to this perspective, an innovative agenda is meant to turn innovation into a permanent and systematic activity that pervades the entire public sector by using dedicated drivers to overcome barriers to innovation (e.g., Sorensen & Torfing, 2012).

The study of the applicability of open innovation theories within the context of services has been taking off recently (Aas & Pedersen, 2012), while the evolutionary motor of innovation had already been tackled by service researchers through the investigation, for instance, of customer involvement. When driven by the evolutionary motor, customer involvement is presented as a dynamic change process in itself (Ordanini & Maglio, 2009). This perspective postulates evolutionary innovation processes within the service context as a structured (although not necessarily sequential) interactive and reciprocal development of change, which takes place

between service providers, customers and other external stakeholders (Fuglsang et al., 2011; Matthing et al., 2004; Ordanini & Maglio, 2009).

In this dissertation, paper 5 is built upon, and contributes to, the literature on the evolutionary motor of innovation processes within the service context. More specifically, it combines the theoretical grounds of collaborative innovation in the public sector with research on the management of innovation within FM services. Paper 5 looks at how internal FM units of local governments navigate and manage the interaction with their stakeholders within public-private collaborations, and more specifically Energy Saving Company (ESCO) projects. Within these collaborations, the units of change that are taken into consideration are multiple: not only the local government, but also the private partners with whom they collaborate to develop and implement innovation. The metaphor of *navigating collaborations* is therefore used in the research question to embed the fact that, within collaborations between public and private parties, we are investigating innovation processes with multiple units of change and that the relationships between these multiple units of change, i.e., (1) the local governments, (2) their internal FM units and (3) the private ESCO partners, are heterogeneous and multi-directional. The structure of ESCO collaborations is in fact influenced by politics and higher level interests, such as the ones of the community and society around each local government. The structure of ESCO collaborations thus impacts on the role played by the FM units with respect to the collaborations between the diverse stakeholders. Such role is not only that of active decision maker (hence the use of *manage collaborations*), but also of passive implementer of decisions that are taken by others (Jensen, Balslev, & Hansen, 2013; Nardelli, Jensen, & Nielsen, 2015), hence the metaphor *navigating collaborations*. The focus of the paper is on the constructive motor of change because of the emphasis on prescribed change through the proactive and aware management of making decisions and sharing decision making with local government and private ESCO providers (Nardelli et al., 2015).

The teleological motor of innovation

A constructive mode of change, on the other hand, generates unprecedented and novel forms of being for an entity. These novel forms, in retrospect, often are discontinuous and unpredictable departures from the past. A constructive mode, in fact, tends to generate a break with the past basic assumptions or framework. This implies that those subject to such changes may experience high uncertainty and need to make sense of the changes (Van de Ven & Poole, 1995). When a single entity is affected by the change, a teleology motor drives the process, and seeks to diverge from the current order of things. As a result, the teleological motor projects fundamental changes in the entity (Van de Ven & Poole, 1995). Examples of theories of organisational change, which are centred around teleological motors, are, for instance, decision making (Simon & March, 1958), adaptive learning (March, Olsen, & Christensen, 1979) and most models of strategic

planning and goal setting (e.g., Chakravarthy & Lorange, 1991). Among the literature on the management of innovation, also firm-centric theories on business model innovation highlight a teleological motor. In fact, within this stream the process of business model innovation has been conceptualised as in a constant fine-tuning state, which involves both voluntary and emergent changes (Achtenhagen et al., 2013; Casadesus-Masanell & Ricart, 2011; Demil & Lecocq, 2010). Characterised by a constructive mode of change, business model innovation processes were shown to be grounded in experimentation and adaptive learning (Sosna, Trevinyo-Rodríguez, & Velamuri, 2010), as well as in *dynamic consistency*, i.e., the capability to build and sustain performance by anticipating and reacting to change (Demil & Lecocq, 2010).

Within studies on innovation in the service context, a stream dedicated to the teleological mode of change emerged from the critiques to new service development models when the practice-driven model of innovation in services was proposed (Nardelli, 2014b). New service development models were accused of failing to incorporate some of the inner characteristics of services as compared to tangible goods, including the fuzzy distinction between service (and innovation) process and service (and innovation) outcome (Ettlie & Rosenthal, 2011; Fuglsang et al., 2011; Martin & Horne, 1993). The practice-driven model, on the contrary, postulates innovation in services as a trial-and-error, overlapping process. According to this perspective, change processes are started and managed in response to market opportunities and/or customer dissatisfaction, and, only after commercialisation, improved and recognised as innovation processes and outcomes (Drejer, 2004; Edvardsson et al., 1995; Kuusisto & Riepula, 2011; Sundbo, 1997).

As both streams are grounded in a representation of innovation as driven by emergent, trial-and-error and overlapping processes, the theories on business model innovation might contribute to a more complete understanding of the practice-driven model of innovation in services, if taken to the service context. Nonetheless, while the role of business model innovation within the service context has been recently recognised (Bryson et al., 2012; Carlborg et al., 2014; Chesbrough, 2011), business model innovation appears to be an under-researched issue within the literature on innovation in services, with the exception of a few studies (e.g., Nair, Paulose, Palacios, & Tafur, 2013; Nenonen & Storbacka, 2010; Storbacka, Windahl, Nenonen, & Salonen, 2013). In paper 1, I address this gap in the existing literature and investigate business model innovation processes within the service context. Nevertheless, theories on business model innovation processes typically adopt a firm-centric perspective. To contribute to theory (and not only to research) in paper 1 I actually investigate the constructive mode of change across multiple units, and thereby focus on the dialectic motor of innovation. In fact, paper 1 emphasises processes of open business model innovation. Thereby I tackle multiple units of change, which are the various business models of a focal organisation and its stakeholders. The findings of the

paper indicate that when one organisation implements an open business model innovation process, stakeholders change too, and their business models develop as influenced by the business model innovation of the focal organisation (Nardelli, 2014b).

The dialectic motor of innovation

The dialectic motor drives innovation that is characterised by (1) constructive mode of change and (2) multiple units affected by the change/innovation. Dialectic processes describe the sequence by which the thesis and anti-thesis confront and engage each other in a conflict struggle, as the dialectic motor deals with the constructive mode and multiple units of change. Events that lead to confrontation of opposites and related resolutions may occur intermittently over the course of development of an organisational entity, and the result of the conflict is a synthesis that breaks the current frame and produces a revolutionary change. The result is a new entity, which is original, rather than being a reproduction of some prior state or entity (Van de Ven & Poole, 1995). An example of perspective that emphasises the dialectic motor of change is the service dominant logic, which defines value co-creation as a phenomenon in which many actors interact in a network to co-create value (Vargo & Lusch, 2004, 2007). In this view, value is defined as uniquely and phenomenologically determined by each party that benefits from it, as a change that somehow improves his or her current state-of-being (Vargo & Lusch, 2004, 2007). The unpredictability of value perception by each beneficiary and the uncertainty of the outcomes of value co-creation characterise the mode of change behind it as constructive, as well as stress the emphasis on multiple units of change.

Another literature field that dedicates its efforts to dialectic processes of innovation is the one dedicated to conflict management within innovation. Among this stream of theories as well as in this dissertation, *conflicts* are defined as incompatible activities (Tjosvold, 1998) that derive from the opposition of a thesis and an anti-thesis, and resolve in a synthesis (Van de Ven & Poole, 1995). Existing research on conflict management stresses how, in terms of organisational change and management of innovation, maintenance of the status quo represents stability. Nonetheless, its replacement with either the antithesis or the synthesis represents a change, for the better or for the worse (G. Chen, Liu, & Tjosvold, 2005; Smith & Tushman, 2005; Song, Dyer, & Thieme, 2006). In other words, this stream of literature highlights how different strategies for the management of conflicts throughout innovation processes unfold, and resolve in the success or failure of innovation. Research on conflict management seems to be completely missing within the service context, where the process of collaboration has been mostly presented as a rather prescribed unfolding of relationships, and tensions and conflicts have not been addressed so far (Nardelli, 2014a). Paper 2 aims at filling in (at least partially) this gap, as it investigates how and why tensions and potential conflicts between heterogeneous stakeholders unfold during processes of innovation in services.

Figure 4 visualises the positioning of the streams of theory (in italics in the figure) that were just presented in the typology by Van de Ven and Poole (1995). In addition, the figure categorises the four papers in this dissertation that emphasise process aspects of innovation in services (in the stars in the figure) according to the motor of innovation that each of them emphasises.

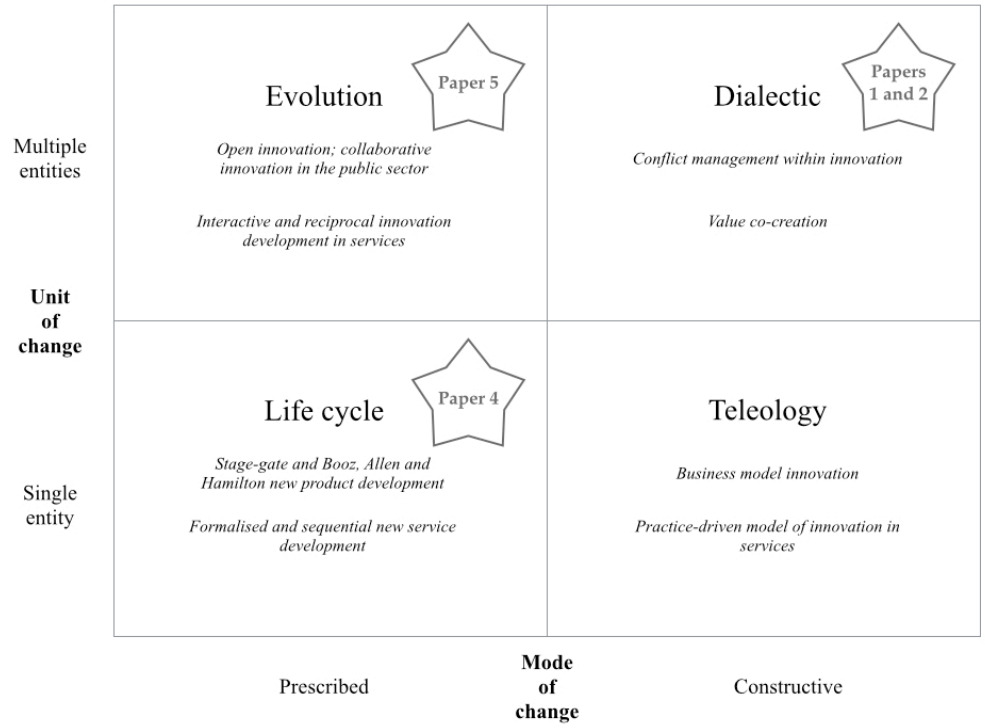

Figure 4: Positioning of literature on innovation processes and related papers.

EMPIRICAL CONTEXT: FM SERVICES

Among services, facilities (or facility) management (FM) is increasingly being recognised as a growing business ground and scientific field (e.g., Coenen et al., 2013; Jensen et al., 2012). In short, FM services are those services, which ensure the correct functioning of an organisation by supporting its employees in the daily implementation of their tasks (Jensen, 2008). In other words, FM services make sure that employees can focus on the core business and not worry about secondary activities, such as real estate management, workplace management and allocation, technical maintenance, cleaning, catering, safety and security and so on. Figure 5, adapted from Jensen (2008), visualises a classification in five categories of the range of FM services that is taken into consideration in this dissertation.

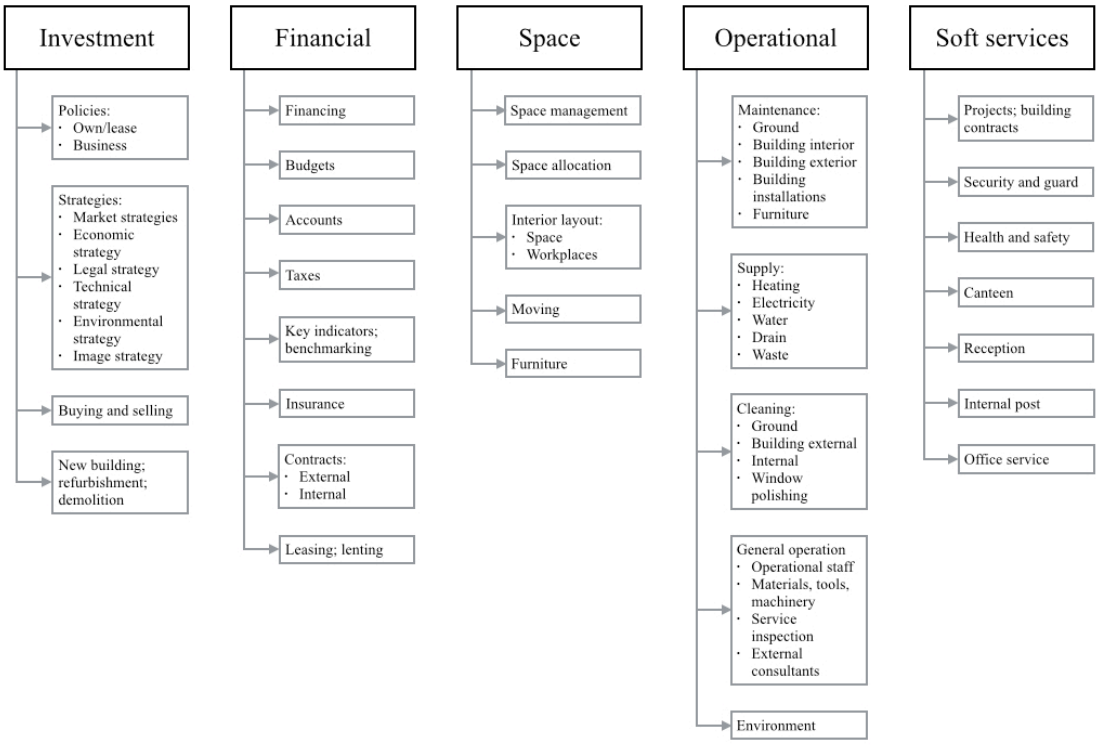

Figure 5: A visualisation of the FM services taken into consideration in this dissertation (adapted from Jensen, 2008).

While most FM services have existed for a very long time, in the last couple of decades a professional and dedicated management of the related activities has become increasingly important for all kinds of organisations, especially in correspondence with the financial crisis at the beginning of the new millennium (Jensen & Andersen, 2010). Traditionally, FM services were distributed across organisations, and their management was allocated to un-dedicated and un-specialised employees. In addition, the related decision-making was often situational and

uncoordinated, which led to inefficiencies and redundancy (Rasmussen, Andersen, & Jensen, 2012). Over the years, dedicated education and research has developed, and organisations have started hiring specialised providers to take care of the management of FM service processes and outcomes. By doing so, organisations have ensured that the decision-making and related implementation could be more efficient and better coordinated (e.g., Jensen & Andersen, 2010; Rasmussen et al., 2012). The pioneer markets, which guided the development of the FM service context in Europe, were the United Kingdom and the Netherlands, followed by Denmark and other Nordic and Central European countries. In Denmark, FM services are estimated to generate a € 4,9 billion actual market, and a € 7,9 billion potential market, and to employ over 50.000 dedicated practitioners, which are distributed among outsourced providers and internal FM units (Jensen, 2009). Please notice that, when talking about specialised providers, I am not only referring to outsourced providers, but also to in-house providers, i.e., the internal FM units of organisations, as they both play a significant role with respect to FM service provision within organisation, be it outsourced, provided in-house or a combination of the two.

Categorisation of FM services within the service context

In the literature on the categorisation of services (e.g., Blind, 2006; Cook et al., 1999; Mills & Margulies, 1980; Vence & Trigo, 2008), FM services are not explicitly mentioned. Based on the characteristics of FM services as postulated in the specialised literature and emerged from my empirical work in the field, the categorisation by Mills and Margulies (1980) appeared to me as the most appropriate to categorise FM services as compared to other services. For instance, Thomas (1978) focuses on the inputs to the service process and distinguishes between (1) equipment- and (2) people-based services. Fitzsimmons and Sullivan (1982) and Lovelock and Young (1979), on the other hand, adopt the perspective of the customer to look at the service outcome and differentiate between services that (1) benefit the customers as individuals and that (2) do something for their tangible possessions. Similarly, Greenfield (1966) looks at the demand side of service outcomes, and dichotomised (1) producer and (2) consumer services to indicate intangible offerings that target (1) corporate customers, i.e., other organisations, and (2) individuals and households (Martinelli, 1991). Building on this dichotomy, Miles (2005, p. 40) differentiates *knowledge intensive services* from other intangible offerings. Specifically, knowledge-intensive services are defined as being mainly concerned with providing knowledge-intensive inputs to the business processes of other organisations (Amara et al., 2009; den Hertog, 2000; Miles, 2005; Tether & Hipp, 2002; Toivonen, 2004). The categorisation by Mills and Margulies (1980), on the other hand, includes supply and demand perspectives, and integrates various dimensions of service offerings, which touch upon both the service process and service outcome. It therefore allows gaining a rather complete overview of how FM services resemble, and differentiates themselves from, other intangible offerings and related processes.

According to Mills and Margulies (1980), the different types of services that compose the service context can be classified into maintenance-interactive, task-interactive and personal-interactive. The three types are categorised on a continuum, on which 7 dimensions and 15 sub-dimensions are rated from low to high, as visualised in Table 7. Firstly, *maintenance-interactive services* are built on the cosmetic interaction between demand and supply, in which the focal point is on building trust to create stability and routinize the service provision. The amount and type of information that are exchanged between the two parties is limited to what is required for the supply to provide the service, as the demand is usually knowledgeable about what is needed and expected. An example of maintenance-interactive services is financial services. Secondly, the service process of *task-interactive services* is centred on a relatively concentrated interaction between demand and supply, specifically due to the relationships between its main stakeholders. In this interaction, the focus is not so much on what the demand wants, but rather on how to satisfy such needs and expectations. Finally, the *personal-interactive* type refer to services, such as knowledge intensive business services (a.k.a. KIBS), in which the interaction between demand and supply is centred on the improvement of the demand's direct intrinsic and intimate well-being. Here, the demand is not aware of its actual needs and tacit expectations. Rather, it is the task of the supply to figure out the needs and expectations of the demand. This causes the demand to be strongly dependent on the supply, and in turn creates asymmetry in the relationship as well as a higher risk of tensions and conflicts (Mills & Margulies, 1980).

Table 7: Categorisations of service types (adapted from Mills and Margulies, 1980).

Dimensions	Sub-dimensions	Maintenance-interactive services	Task-interactive services	Personal-interactive services
		Example: Financial services	*Example: FM services*	*Example: KIBS*
Information	**Information quality**	Low	Moderate	High
	Information quantity	High	Moderate	Low
	Confidentiality	Low	Moderate	High
Decision	**Complexity of provider decisions**	Low	High	High
	Importance	Low	Moderate	High
	Speed of feedback (demand to supply)	High	Low	Low
Time	**Interface duration**	Brief (low)	Moderate	High
	Total time in direct contact	High	Moderate	High
Problem awareness	**Demand knowledge about problem**	High	Moderate	Low
	Demand ability to evaluate services	High	Moderate	Low
	Demand expectations vs. supply capabilities	High	Moderate	Low
Transferability	**Substitutability of supply**	High	Moderate	Low
Power	**Perceived power of supply with respect to demand**	Low	Moderate	High
	Supply status in the eyes of demand	Low	High	High
	Supply authority with demand	Low	High	High
Attachment	**Supply identification with demand**	Low	Moderate	High
	Conflict potential	Low	Moderate	High

While Mills and Margulies (1980) do not explicitly mention FM services, they cite as example engineering services. Engineering services include several of the FM services in Figure 5, with which they share the nature of task-interactive services. The interaction between demand and supply within the context of engineering, as well as of FM services, is based on the exchange of the information on the issues to be solved and the needs and expectations to be satisfied, without precise indication of *how* satisfaction should be reached. The service process of FM services, specifically, is centred on the close interaction between (1) the organisation that needs FM services to be able to focus on its core business and (2) the FM service provider(s). The demand of FM services, moreover, is aware of its needs and expectations, but does not know how to satisfy them, which is why internal units are created and/or outsourced providers are hired (Alexander, 1993, 1996; Coenen et al., 2013; Jensen, 2008, 2010). For example, when a new contract is signed between an internal FM unit and an outsourced provider, the agreement does not typically cover in detail the route that cleaners will follows, or the exact food that will be

served in the canteen. Rather, the characteristics of the service to be provided are indicated in general terms, e.g., facilities should be cleaned once a day and the canteen should serve healthy food in the morning and at midday. Such characteristics are determined on the demand side and negotiated with the providers, to ensure that needs and expectations of the different demand stakeholders are satisfied to an acceptable degree (Nardelli & Scupola, 2013; Nardelli, 2013). Specifically, the demand is usually well aware of the problems, needs and expectations, as well as able to evaluate their satisfaction. However, this awareness is typically accompanied by lack of knowledge and skills to tackle the specific issues. The supply brings in specialised knowledge and skills, without which the demand cannot take care of the FM (or engineering) services efficiently. This creates dependency of the demand on the supply: organisations usually know what they need to take care of in terms of technical maintenance as well as space management. However, without dedicated—internal or outsourced—providers, they risk to pay high prices and oversee potential synergies in the overall FM service provision (e.g., Jensen & Andersen, 2010; Rasmussen et al., 2012).

Along with the extensive flow of information that needs to be exchanged, the asymmetry of power makes it harder to switch from one provider to another, as transitions are often costly and complex. Therefore, relationships between demand and supply tend to have a relatively long duration (Storgaard & Larsen, 2012). On the other hand, the dependency of the demand on the supply increases the risk of tensions and conflicts between parties, as Mills and Margulies (1980) point out along with the other characteristics of task-interactive services. Paper 2, for instance, tackles this specific aspect of FM services, as it investigates the unfolding of tensions and conflicts throughout innovation processes within the FM service context. Among other findings, the paper shows the complex and expensive process of data collection and analysis that the demand, i.e., the Danish multi-national organisation Novozymes, had to go through as a consequence of their decision to discontinue the relationships with their main provider, due to the inefficiencies and lack of transparency in the service provision (Nardelli, 2014a).

Finally, the decision-making process of engineering as well as FM services is characterised by high complexity, due to the continuous emergence of specific problems, needs and expectations, which require novel solutions (e.g., Coenen et al., 2013; Jensen, 2008). In the case of space management, for instance, when a new employee is hired, it is not sufficient to look at the physical space available in a facility to decide where to locate his or her new workplace. On the contrary, it is important to also consider other variables, such as corporate attitude towards workspaces, HR issues, consequences on cleaning, catering, safety and security and so on (Mitchell-Ketzes, 2003).

Background: innovation in FM services

The context of FM services has, over the years, developed towards becoming a distinct field of practice, profession and market (Rasmussen et al., 2012). At the same time, researchers have started to dedicate their attention to this context, and have produced specialised literature (published, for instance, in the Journal of Facilities Management or in Facilities). FM scholars also used different theoretical perspectives to investigate various issues related to FM services, including innovation (see, e.g., Scupola, 2012). Despite their traditional role as supporting, and thus secondary set of activities as compared to the core business of the organisations they serve, FM services have established themselves as a key service sector in the last three decades. The FM sector, in fact, is currently characterised by a diverse and highly competitive market of FM contractors and providers, in-house FM units, FM consultants and professional FM institutions (Cardellino & Finch, 2006) that form heterogeneous FM supply chains (Nutt, 2000) and value networks (Coenen et al., 2013). Moreover, FM services are combined in specific and *ad hoc* bundles of tasks, activities and processes that depend on the features, market and context in which the client organisation operates (Jensen, 2008). For a long time, therefore, FM organisations have been paid attention to only in connection to the core business of the entities they support. Nonetheless, FM internal and external providers have often demonstrated sufficient dedication and drive to implement new service development, and even exceeded customer expectations when adding value to their client organisations (Mudrak et al., 2005; Pitt & Tucker, 2008). Throughout this development, researchers have also moved away from the paradigm that saw FM services as supporting function for the core business of organisations, and have begun to highlight the added value potential of FM services as well as of innovation within the FM service context (Cardellino & Finch, 2006; Goyal & Pitt, 2007; Jensen, 2008, 2010; Jensen et al., 2012; Scupola, 2012).

The literature on FM innovation, however, is still developing. It focuses mainly on highlighting the role of innovation as a tool to succeed and compete in the dynamic contemporary FM market, and affirm the increasingly important role that FM plays within organisations (Goyal & Pitt, 2007; Lindkvist & Elmualim, 2010; Mudrak et al., 2005). Previous studies have shown that FM organisations are able to, and, in fact, do manage innovation as a process, and tend to have several projects under development at the same time. However, they struggle to establish innovation routines that enable successful innovation management in the sense of systematic new service development (Cardellino & Finch, 2006; Mudrak et al., 2005). Goyal and Pitt (2007), specifically, stress the need to involve and cooperate with all stakeholders during FM innovation processes, to manage the diverse interactions that characterise FM. Similarly, Noor and Pitt (2009) argue that a collaborative and partnership approach to FM innovation is crucial to bridge the demand and supply (whether in-house or outsourced) of FM service delivery by building an innovation network with all actors involved. These results, however, are limited to variance

considerations and do not address process aspects of FM innovation. Therefore, this dissertation also contributes to the specialised literature on innovation within FM service, by shedding light on innovation processes and related interactions between stakeholders.

But what do I refer to exactly in this dissertation, when I talk about innovation within the FM service context? In the next sub-section I present the operationalization of the main concepts presented in the theoretical background and applied, for this dissertation, in the FM service context.

Operationalization of concepts: Innovation in the FM service context

To briefly recall what was explained above, an innovation process is here defined as the process that starts with the generation of an idea and ensures the development, implementation and launch of an innovation outcome. The innovation outcome is a disruptive change in the established landscape of the receiver, which brings an economic benefit to its developer(s) through the added value provided to the receiver. An innovation outcome can be more or less disruptive in the eyes of its receivers depending on how much change it brings to his or her established landscape, as value is subjective and contextual. Value is defined as a somehow improving change in the state-of-being of the receiver, who interprets it individually and on the basis of the satisfaction or dissatisfaction of the specific needs and expectations that he or she experiences in each circumstance. Innovation outcomes, which are taken into consideration in this dissertation, are new or improved:

1. Technologies related to FM services;
2. Ways of organising work for FM service management;
3. FM service offerings;
4. Delivery processes of FM services;
5. Business models of FM service organisations, i.e., of external, specialised FM providers and internal FM unit.

The processes of development, implementation and launch that led to such outcomes were the innovation processes under investigation. Please notice that, when referring to FM services, I am talking about the set of services outlined in Figure 5.

For this dissertation, I operationalized the above-mentioned concepts by including the following instances of innovation within the context of FM services in my data collection and analysis:

1. Technological innovation in FM services: development and implementation of new or improved technological tools behind FM service offerings and related provision. This includes, e.g., software for the management of FM-related data; Building Information

Modelling (a.k.a. BIM) systems; sensors to track user behaviour within facilities and thus ensure highly customised service provision;

2. Organisational innovation in FM services: development and implementation of new or improved organisations behind FM service offerings and related provision. This includes, e.g., global management of FM services in a multi-national organisation in which FM services used to be dealt with locally; output-based contracts (i.e., pricing based on user satisfaction), when the norm used to be activity-based contract (i.e., pricing based on the amount and frequency of provided services);
3. Innovation in FM service offerings: development and implementation of new or improved service offerings. This includes, e.g., new catering service in the canteen; floor managers to substitute cleaning teams and integrate different services within one single service providing figure;
4. Innovation in FM service delivery: development and implementation of new or improved organisational process behind provision of service offering(s). This includes, e.g., from individually assigned workplaces to activity-based seating; from output-based service provision to activity-based cleaning service provision, i.e., floor managers clean when it is necessary, as they are supported by technological tools that signal when a service is required in a specific area;
5. Business model innovation: development and implementation of new ways to create, capture and deliver value (i.e., business model) behind FM service offerings and relative provision. This includes, e.g., from business model centred technical service provision exclusively, to business model centred on integrated FM service provision (in the case of outsourced providers); from one person in purchasing department to manage FM services to a centralised FM unit that would take care of FM services all across the organisation (in the case of the internal FM unit).

As discussed above, scholars have typically distinguished between product and process innovation, although in services this differentiation is of difficult application. The examples that I here propose should therefore not be seen as a black-and-white representation of the concept they are associated to, but rather as the operationalized instances of the different concepts as applied in this dissertation. This means that, when analysing the data, I used the concepts in Table 5 for line-by-line coding, to categorise the instances and incidents that emerged from interviews and archive data. Such categorisation formed the grounds for the axial coding phase of the data analysis, during which the various types of innovation outcomes were connected to the unfolding of innovation processes. Please refer to the methodological sections for a more detailed explanation of the use of theoretical concepts in this dissertation. Notice that in paper 1 FM services are called *facility services* for stylistic purposes.

Operationalization of concepts: Stakeholders of innovation in the FM service context

According to the European standards, FM services deal *with the integration of processes within an organisation to maintain and develop the services, which support and improve the effectiveness of its primary activities* (EN15221, 2006). Because of their supporting nature, FM services are characterised by a service process, which involves a heterogeneous range of stakeholders on the demand side. In fact, each organisation requires a more or less formalised unit to take care of the FM services, and ensure that its employees can carry out their core tasks and activities. Such unit, the internal FM unit, carries the responsibilities of FM service provision, and, when FM services are outsourced, manages the relationships and outsourcing contracts with the external FM service provider(s). The internal FM unit thus plays a double role: (1) internal service provider in the eyes of the organisation and its employees; and (2) customer in the eyes of the external service provider, with whom it negotiate the contracts at the basis of the service provision. Beside the internal FM unit, on the demand side of the FM service provision there are (1) the organisation as a whole, which orders and pays for the FM service provision; and (2) its employees, who eventually receive and take advantage of the FM service provision (Coenen et al., 2013; EuroFM, 2011; Nardelli, 2013). Figure 6 below visualises the service process, which characterises FM services, by highlighting the flow of interactions between the main stakeholders. The service process starts with the organisation as a whole that orders and pays for (through a dedicated budget) the FM service provisions to the internal FM unit. For instance, a university would order a generic combination of FM services with the limitation that it has to ensure the well functioning of teaching and research activities, for a total of 1000 researchers, teachers, administrative personnel and students. The university pays for the FM services by allocating a dedicated budget, whose responsibility is assigned to the FM unit. The FM unit orders a generic combination of space management, technical maintenance, safety and security, cleaning and catering that would be necessary to ensure the functioning of the university's core activities to an outsourced provider. The outsourced provider takes care that a specific combination of FM services (designed by the provider on the basis of the needs that the internal FM unit has pointed out) is provided to the researchers, teachers, administrative personnel and students. The latter finally receive the FM services, and can focus on researching, teaching, administering, studying etc. without have to worry about the facilities they use for it. Please notice that this example, as well as the ones illustrated below is a simplification and is not related to a specific real-life instance. The examples were inspired by my empirical work, but were simplified here to aid a clearer understanding of the discussed issues.

In the FM terminology, as outlined in the figure, the three demand stakeholders, i.e., respectively the organisation as a whole, the internal FM unit and the employees of the organisation, are characterised as *clients*, *customers* and *end users*.

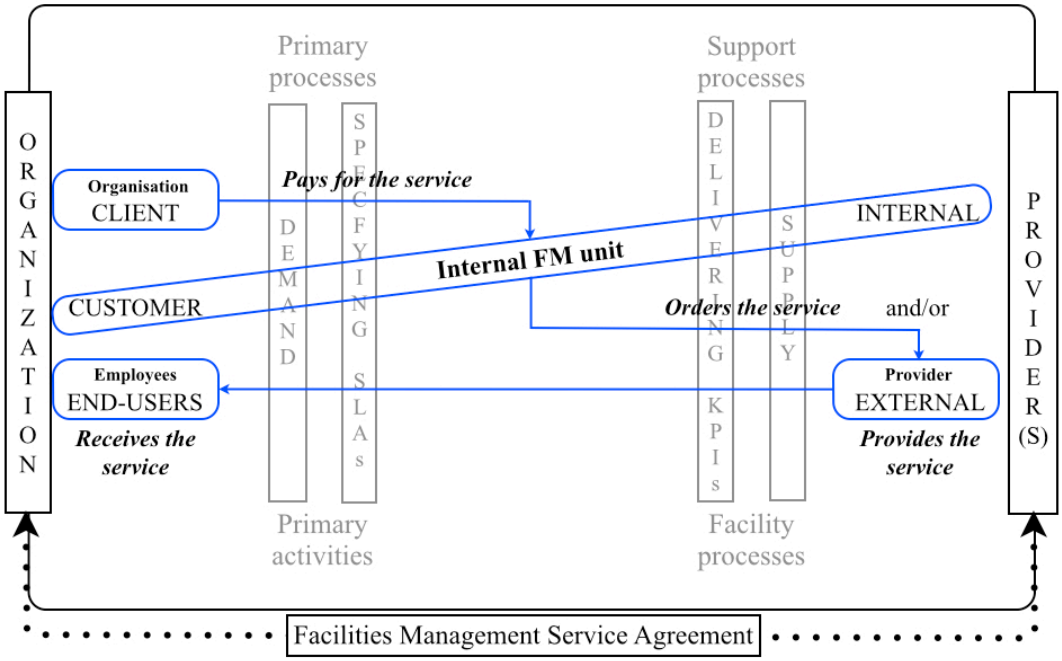

Figure 6: The FM service process (adapted from EN15221, 2006).

At the same time, in the literature on innovation in services, the role of customers is acknowledged in the very definition of services, in that intangible offerings are postulated as being simultaneously produced and consumed as well as heterogeneous because of the multiple perceptions of diverse customers (Fitzsimmons & Fitzsimmons, 2006; Jong et al., 2003; Vargo & Lusch, 2004, 2007). As mentioned above, the innovation process of such intangible offerings, can be planned, intentional or unintentional, and emerges through an interactive learning process that is initiated by any of the involved parties, be it the provider(s) or the customer(s) (Gallouj & Savona, 2008; Gallouj & Weinstein, 1997). Throughout research on innovation in services, however, the involved parties are defined in different ways (e.g., customers, users), which makes it important to clarify the different definition of the related operationalization as it was applied in this dissertation.

The interactive character of innovation in services emerged along with the differentiation approach, when interactivity was pointed out as one of the peculiar characteristics of services as compared to tangible good (Carlborg et al., 2014). Edvardsson and Olsson (1996), for instance,

focus on the perceptions of service quality by the customers to stress that one of the major tasks in developing new services is to build the right quality from the start. To do so, it is necessary to invite customers in the process of developing new services. Specifically, they define the customer as *the person or organisation that receives the outcome of the innovation operation, and then perceives the added value and quality of the service based on his or her own needs and expectations*. Needs and expectations are subjective, and, while the first ones are basic, the latter are linked to the combination of needs with the overall *ex ante* perception that the customer has of the service provider and its offering(s) (Edvardsson & Olsson, 1996). Similarly, Gallouj and Weinstein's (1997) characteristics-based approach is centred around the interactivity of the innovation process in services, which again relates to the role of customers as active receivers of the service provision and interpreters of its added value and quality.

Nevertheless, the first article explicitly dedicated to customer involvement was published only in 2001 (von Hippel, 2001). After that, the intentional or unintentional involvement of customers in the innovation process became a popular topic of investigation among researchers of the service context (Carlborg et al., 2014). In 2002, Alam published his first article on how to manage user involvement during innovation processes in services, and introduced the term *user*. Nonetheless, Alam (2002) defines *user* in the same way in which previous literature (such as, e.g., Edvardsson & Olsson, 1996; Gallouj & Weinstein, 1997) had depicted the term *customer*, and underlines how, in his work, the two terms are used inter-changeably (Alam, 2002, p. 260, end–note n.1). Actually, the two terms seems to be used interchangeably across all literature on innovation in services, as existing research alternates between the two with no explicit motivation (see, e.g., Abramovici & Bancel-Charensol, 2004; Alam, 2011, 2013; Bitner et al., 2008; Busse & Wallenburg, 2011; Johne & Storey, 1998; Kuusisto & Riepula, 2011; Melton & Hartline, 2010; Mota Pedrosa, 2012). However, a clarification is necessary for this dissertation. In fact, within FM services, the selected empirical field, the distinction between the terms *clients*, *customers* and *end users* is applied to represent the fact that different receivers play different roles with regards to the provided and innovated service (Coenen et al., 2013; Nardelli, 2013). The three terms are therefore applied and operationalized as follows to distinguish between demand stakeholders:

1. Client(s) are defined as the *payer(s)*, i.e., the individual(s), unit(s) or organisation(s) that pays for the service provision. In FM services, the client usually corresponds to the organisation as a whole, which, through the decisions of the executive management, allocates resources to be used to ensure that FM services are provided. The client thus benefits from the service provision in that its employees are enabled to carry out the core business efficiently;
2. Customer(s) are defined as the *orderer(s)*, i.e., the individual(s), unit(s) or organisation(s) that orders the service provision. In FM services, the customer role is played either by the

internal FM units of organisations, which are in charge of ordering FM service provision to specialised providers when FM services are outsourced, or by the organisational units, which requests specific sets of FM services to the internal FM unit when FM service provision is taken care of in-house. The customers benefit from the service provision in that the latter is implemented by from a specialised and dedicated provider, who has the skills, knowledge and resources to optimise the efficiency of the service providing itself.

3. End user(s) are defined as the *receiver(s)*, i.e., the individual(s), unit(s) or organisation(s) that receive the service provision. In FM services, the end users are typically the individual employees (and the customers) of the organisation, who eventually are the receivers of the operational service provision and benefit from its added value on a day-to-day basis, in that they are enabled to focus on their core tasks and activities.

In addition, FM services often involve two sets of providers: (1) internal provider, i.e., the internal FM unit, and (2) external provider(s), i.e., the outsourced, specialised provider(s).

The different perspective of each set of stakeholders on the provided service and/or related innovation typically creates different needs and expectations across diverse parties (Coenen et al., 2013; Jensen et al., 2012). For instance, the university mentioned above would be interested in the FM services being cost efficient and providing a coherent image of the university's research and teaching activities, while students and staff would be more focused on whether the food in the canteen tastes good and the facilities are cleaned according to their individual and subjective standards. Nonetheless, such needs and expectations will always be dependent on each other, as they belong to the same network and refer to the same FM service and/or innovation. For example, if the university emphasises group work-based teaching, teachers cannot expect to carry out teaching activities in facilities designed for front lecturing.

This differentiation of roles does not imply that the sets of stakeholders are pre-determined and static: each individual, unit and/or organisation can find itself in one or the other role depending on the specific situation (Nardelli & Scupola, 2013), which is what makes it difficult to understand. In a private corporation, for instance, the executive managers, who represent the organisation as a whole, play the role of clients when ordering the FM services and allocating the related budget; but they are also individual end users as they take advantage of the facility on a day-to-day basis to carry out their core tasks and activities. Nonetheless, such differentiation is relevant when investigating the interactions between stakeholders within innovation in FM services, as different roles carry different needs and expectations—and will therefore relate to innovation differently (Nardelli & Scupola, 2013; Nardelli, 2014a, 2014b). For instance, the launch of a new canteen service, such as the substitution of traditional self-service restaurant with desk-delivery of lunch packages, might be perceived differently from different stakeholders, as depicted in Table 8. Please notice that the example in Table 8 is a simplification

and is only meant to illustrate how different stakeholders can have different reactions to the same innovation due to contrasting needs and expectation.

Table 8: Example of reactions of different stakeholders to the desk-delivery of lunch packages (innovation in canteen services).

	Needs and expectations	Positive effect of desk-delivery of lunch packages on needs and expectations	Negative effect of desk-delivery of lunch packages on needs and expectations
Client (payer)	FM services are provided efficiently, so that employees can carry out the activities and tasks related to core business with the best possible outcome for the organisation as a whole, e.g., employees are motivated and work efficiently.	More efficiency, as employees save the time spent in the canteen.	Less knowledge sharing, as employees are less likely to exchange explicit and tacit knowledge if they do not sit together at lunch.
Customer (orderer)	FM services are provided efficiently, so that the resources available to FM are used in the best possible way, e.g., expenses do not go over the budget and both clients and end users are satisfied.	Increased space availability, as the old canteen can be re-furbished and used for other purposes, such as meeting rooms, fitness studio or others, which can increase the satisfaction of end users.	Stronger impact of the canteen services on the budget allocated to FM services, as more personnel is needed to delivery the lunch packages than to serve in a self-service restaurant.
End users (receivers)	FM services are provided in a way that fits the individual expectations of the end users, e.g., actually liking the food and/or the contact with fellow employees during lunch breaks.	More free time, as employees who work through their lunch break will be able to leave the office earlier.	Less efficiency, as employees lose the opportunity to take a break and re-fresh their thoughts before going back to work.

To conclude, this dissertation refers to *interactions between stakeholders*, rather than to customer (or user) involvement as done in previous research (e.g., Alam, 2002; Edvardsson & Olsson, 1996; Gallouj & Weinstein, 1997), to incorporate the multiplicity of perspectives that different actors might have with regards to the innovation process they are involved into.

Literally, however, the meaning of the term *stakeholders* goes beyond the parties related to demand and supply, as it includes *all persons with an interest or concern in something, especially a business* (Oxford University Press, 2014c). Apart from suppliers and demand stakeholders, such as clients, customers and end users, stakeholders of innovation in services are, for instance, partners, competitors, surrounding communities and even society as a whole (see, e.g., Beynon-Davies, 2005; IfM & IBM, 2008; Mele, Spena, & Colurcio, 2010; Vargo & Lusch, 2011). In this dissertation, and specifically in papers 1, 2 and 5, the term *stakeholders* indicates

the demand and supply stakeholders presented above, as well as competitors, partners and affected communities of the organisations under investigation. Nonetheless, in paper 4 *stakeholders* substitutes *users* when referring to user involvement, and it includes only the three demand stakeholders, i.e., clients, customers and end users. The purpose of such simplification lies within the heterogeneity of the value network of FM services just discussed (Coenen et al., 2013), given the aim of the paper to investigating the involvement of demand stakeholders in innovation within the context of FM services.

METHODOLOGY

As this dissertation includes five papers with different objectives and questions (see Table 2 for the overview of the papers), it touches upon various aspects of innovation in services while maintaining a dedicated focus on the interactions between stakeholders. As a consequence of such variety, I applied a heterogeneous epistemological approach and research design across the papers, which I built specifically to match with each specific research objective and question. Nevertheless, the dissertation as a whole, as well as each individual paper is grounded in some common ontological assumptions. These assumptions impact on the research approach and design, and thus need to be clearly depicted. In this fourth section of Part I, I first present the ontological assumption that ground this dissertation, to then outline the epistemological and research approaches that I adopted, along with the design and methods I used in the different studies.

Ontological assumptions

The investigation of change processes, including innovation, finds its foundations in two different ontologies, which originate from ancient Greek philosophy. Throughout the centuries, these two ontologies then developed (Rescher, 1996) and were finally integrated within organisational studies. Scholars of organisational management, in fact, used these two ontologies to explain how they define organisations when investigating processes of change (Langley et al., 2013; Van de Ven & Poole, 2005). In the first perspective the world is made of entities, i.e., things that change over time through processes: entities exist independently of their context. In other words, their behaviour may vary over time, but their nature of entities remains unchanged—even if the context around them evolves (Langley et al., 2013; Van de Ven & Poole, 2005). According to this view, change patterns are something that happens to organisations. Organisations, in turn, are fixed and identifiable entities (Klarner & Raisch, 2012). In the second ontology the world is presented as made of processes. Within this process-based world, events arise out of, and are constituted through, their relationships with other events (Rescher, 1996). Such perspective emphasises entities as temporary instantiations of on-going processes that are in continuous state of becoming. Therefore, within this approach, scholars refer to organising rather than organisations (Langley et al., 2013; Van de Ven & Poole, 2005), and present change as the way in which reality is brought into being in every instant (Langley et al., 2013; Rescher, 1996; Tsoukas, 2005).

Ontologies, as well as epistemologies, should fit with the research objectives and questions they are associated to. The overall aim of this dissertation is to investigate interactions between stakeholders throughout innovation processes in service organisations, and is based on the ontological assumption that *organisations are identifiable entities that develop over time*. The

dissertation as a whole, as well as each of the five attached papers, is therefore grounded in the first ontological perspective. The focus is on how and why changes occur, whereby change is seen as a succession of movements of a recognisable entity (the organisation) over time (Klarner & Raisch, 2012; Rescher, 1996). In this dissertation, I therefore refer to the following concepts:

1. Entities, i.e., the subject of change, might be individual jobs, work groups, organisational strategies, programs, products, and/or organisations as a whole;
2. Processes are defined as the progression of events in the existence of an organisational entity over time;
3. Change is interpreted as the empirical observation of difference in form, quality, or state over time in an organisational entity;
4. Development is characterised as a change process that unfolds during the duration of an entity's existence, from the initiation to its end or termination (Van de Ven & Poole, 1995, 2005);
5. Outcomes are considered as inputs that are made sense of in determining further activity, and not in terms of static performance (Langley et al., 2013, p. 10).

Epistemological approach

Van de Ven and Poole (2005) distinguish between two epistemological approaches that are typically used in organisational studies to tackle change and innovation: variance and process theories (Van de Ven & Poole, 1995, 2005), which have been briefly introduced in the theoretical background.

In the first, the so called *variance theory methodology*, change is defined as a dependent variable, and can be explained statistically in relation to a series of independent variables (Poole, Van de Ven, Dooley, & Holmes, 2000). The focus of variance methods is typically on the variables that represent the most important aspects or attributes of the subject under investigation. Explanations are presented in form of causal statements or models, and incorporate such variables. In fact, an implicit goal of variance research is to establish the necessary conditions to bring about an outcome (Van de Ven & Poole, 2005). In summary, variance approaches offer good explanations of continuous change. This continuous change is driven by deterministic causation, i.e., by an identified cause-effect relation. Yet, this does not allow to fully conceptualise change as it overlooks many critical aspects of change processes, such as contextual influence and multiple time scales in the sub-processes (Langley et al., 2013).

Process theories, on the other hand, are narratives that describe a sequence of events on how development and change unfold. From the process perspective, change occurs as a story or historical narrative develops. Therefore, the unfolding of change is tackled by narrating the temporal sequence of events that unfold in an organisational environment (Langley, 1999;

Pettigrew, 1997; Poole et al., 2000). The flow of time is considered irreversible, and temporal succession actually treated as a developmental process (Van de Ven & Poole, 1990, 2005). Process methods, therefore, should allow capturing a higher degree of complexity as compared to variance approaches. In fact, process methods incorporate various types of effect into their explanations, which include: (1) critical events and turning point; (2) contextual influence; and (3) formative patterns that give the overall direction to change. It also involves causal factors, which influence the sequencing of events (Langley et al., 2013; Van de Ven & Poole, 2005). Langley (1999), for instance, stresses how, to produce reliable research, process studies require methods that can (1) identify and test temporal linkages between events and overall temporal patterns; and (2) cope with the multiple time scales that often occur in processes. To achieve such results, process methods are very labour-intensive and typically involve the collection of large amount of multi-faceted data (Langley, 1999; Pettigrew, 1997). By combining the two ontologies presented above with these two epistemological approaches, Van de Ven and Poole (2005) propose a typology of research approaches for the investigation of change and innovation within organisational studies (Table 9).

Table 9: Typology of research approaches for organisational change and innovation (Adapted from Van de Ven and Poole, 2005).

		Ontology	
		A noun, a social actor, a real entity ("thing")	**A verb, a process of organising, emergent flux**
Epistemology	**Variance method**	*Approach I* Variance studies of change in organisational entities by causal analysis of independent variables that explain change in entity (dependent variable).	*Approach IV* Variance studies of organising by dynamics modelling of agent-based models or chaotic complex adaptive systems.
	Process narratives	*Approach II* Process studies of change in organisational entities narrating sequence of events, stages or cycles of change in the development of an entity.	*Approach III* Process studies of organising by narrating emergent actions and activities by which collective endeavours unfold.

As mentioned above this dissertation is grounded in the first ontology, and defines organisations as identifiable entities. In addition, it adopts both the variance method and the process narratives in different papers. I applied Approach I in paper 3, and combined the first ontology with a variance methodology. In papers 1, 2, 4 and 5 I followed Approach II, and adopted a process approach. On one hand, Approach I emphasises the study of change in organisational entities with a variance methodology. It thus offers a good picture of the cause-effect mechanisms that are behind a process. In paper 3, Approach I resulted as the most appropriate to outline the co-dependency between innovation in services and ICT, as the study was centred on the investigation of the cause-effect relationship between the two constructs. On the other hand, Approach II

conceptualises change as a succession of events, stages, cycles or states in the development or growth of an organisation. Within Approach II, scholars study how change unfolds in organisational entities. This is what I do in papers 1, 2, 4 and 5. More specifically, I use Approach II to identify coherent periods of activities through which processes unfold (Van de Ven & Poole, 2005). In this perspective, time is divisible and differentiated. This means that time is dependent on its observer(s), and that critical events are determined by what the observers themselves notice as significant (i.e., *transactional view of time*). I therefore measured time by identifying events that are critical or significant to the subjects, who were involved in the processes under investigation (Van de Ven & Poole, 2005, p. 1390).

The critical incident technique

To incorporate such transactional view of time in my empirical work, I applied the critical incident technique (Flanagan, 1954), as visualised in Figure 7 on page 67. The critical incident technique consists of a flexible set of principles that was developed in the mid-20th century by psychologists, for the main purpose of job analysis. Originally, the critical incident technique was meant as a tool to create a functional description of an activity, by identifying the aim or objective of such activity before any other aspect of it (Butterfield, Borgen, Amundson, & Maglio, 2005; Flanagan, 1954). Following its application to various disciplines, the critical incident technique was classified as a qualitative research approach that is characterised by:

1. The focus on critical events, incidents or factors that characterise a specific situation or event in the eye of the observers;
2. The data collection primarily from interviews;
3. The data analysis conducted by determining the frame of reference, forming categories that emerge from the data, and determining the specificity or generality of the categories;
4. The narrative form of categories with operational definition and self-descriptive titles (Butterfield et al., 2005).

The critical incident technique has recently been used in a variety of service contexts to explore service research issues, and scholars have proved its reliability as method to be applied in research within the service context (Gremler, 2004). Researchers have used the critical incident technique primarily in business-to-consumer contexts. Nevertheless, the characteristics of such method make it appropriate, and have been proven successful, for use in a broader range of issues, including the cross-organisational business-to-business context investigated here (Butterfield et al., 2005; Gremler, 2004).

At the same time, the critical incident technique embeds some inherent weaknesses that are worth mentioning. First of all, respondents have limited and varied ability to recall historical events. This implies that the collected data might be heterogeneous and that day-to-day activities

might be overlooked. In this dissertation, informants typically focused on critical incidents that had occurred during the last six months before the interview (Ahola, 2009; Flanagan, 1954; Yin, 2009). In addition, the interview guides included questions that touched upon, and explicitly asked examples of, critical examples of day-to-day activities. When the interview touched upon events that took place more than six months prior to the interview, archive data mining complemented interview data. This was carried out, for instance, in the longitudinal in-depth study for paper 2. In this study, the data collection covered a time period of over 8 years, which made it necessary to integrate interviews with archive data. Secondly, individuals might be reluctant to discuss events that happened in the past. The risk increases if the respondents were themselves responsible of negative outcomes or if they personally or professionally experienced the incident as negative (Ahola, 2009; Flanagan, 1954; Yin, 2009). Thirdly, the importance of critical incidents is relative and thus hard to evaluate objectively (Ahola, 2009). Archive data mining and the combination of interviews with more individuals on the same events were implemented here to strengthen the quality of data collected for this dissertation. Finally, the inherent flexibility of the technique might cause lack of methodological rigor and inconsistent findings. To ensure reliability of the application of the critical incident technique to my empirical work, I rigorously followed the recommendations by Butterfield et al. (2005) while collecting and analysing data, and built on previous studies that were based on the critical incident technique (such as, e.g., Ahola, 2009; Butterfield, Borgen, Amundson, & Erlebach, 2010; Gremler & Gwinner, 2008; Specht, Fichtel, & Meyer, 2007).

I explicitly asked respondents to elaborate on the issues that arose during the interviews, with emphasis on those events that made a significant, either positive or negative, contribution to the activities or phenomena that we were discussing (Butterfield et al., 2010; Gremler, 2004; Specht et al., 2007). More specifically, once a respondent mentioned an event that he or she identified as critical, four elements were discussed and documented:

1. Time of the critical incident, i.e., when the incident occurred;
2. Description of the critical incident, i.e., what happened;
3. Cause for the critical incident, i.e., what were the reasons behind the occurrence of the incident;
4. Results of the critical incident, i.e., what was the outcome of the incident (Ahola, 2009, p. 88).

I then coded and interpreted the critical events that resulted from the data collection throughout the analysis by classifying them into concepts, categories and links thereof. The purpose of such analysis was to understand how concepts and categories, i.e., the abstraction of the examples that were raised by respondents, were related to each other and how the progression of events unfolded over time (Ahola, 2009; Butterfield et al., 2010; Gremler & Gwinner, 2008). Figure 7

visualises the process, based on the critical incident technique, through which I extracted findings from the data. Please notice that the process in the figure is *linear* only to ease representation and support a clearer understanding on the application of the critical incident technique. As discussed below (in the *Research design* sub-section), data collection and analysis were in fact overlapping and iterative.

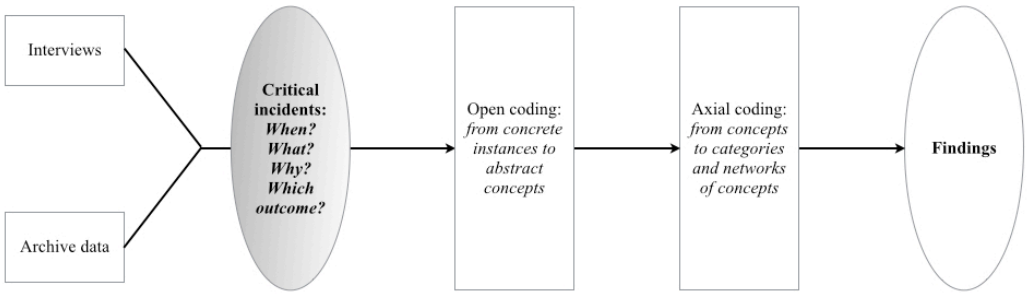

Figure 7: The research process and the application of the critical incident technique.

For instance, the phases and steps of the business model innovation processes in paper 1 were identified on the basis of the critical incidents that interviewees pointed out in relation to the business model development under investigation. Similarly, I used the critical incident technique in paper 2. Here, the purpose was to analyse the longitudinal, in-depth case study—on which the study is built upon—as an embedded case study. This was achieved by extracting from the data those critical incidents that could be associated to innovation processes as defined by the theory.

Research design

To build the Ph.D. research in solid theoretical foundations, I started my research process by identifying the theories on the management of innovation—in general and specifically within the context of services—that would ground my theoretical and empirical work for the different articles. The theoretical background presented above depicts the overall results of such preliminary work. Table 5, moreover, summarises the definition of the main concepts that were derived from the theoretical foundations and applied in this dissertation. In this section I depict the multi-faceted research design behind this dissertation and present the methods for data collection and analysis that I applied through throughout the Ph.D. research.

Given the multiplicity of research objectives and questions that is involved in this dissertation, I followed a qualitative, yet varied research design across the five papers. As mentioned above, paper 3 is the only one that follows a variance approach. To be more specific, in paper 3 I carried out a concept-centric literature review to investigate the relationship between innovation in services and ICT. Please refer to the methodology section of the paper for a detailed

explanation of the design and used methods. The other four papers follow a qualitative process approach and apply different methods for the data analysis. The methods, in fact, were designed to match with the corresponding research questions and objectives.

Qualitative research methods well correspond to a perspective that emphasises process questions (Langley et al., 2013; Langley, 1999), which is why I implemented qualitative data collection and analyses for all studies. Langley (1999) stresses how the combination of different methods for empirical work, i.e., data collection and analysis, can be useful to examine processes in depth. She also points out that longitudinal data are needed to investigate how processes unfold over time. Archival data, on the other hand, can support tracing event chronologies and development of meanings over time (Langley, 1999).

For this dissertation, I adopted a research design that embeds the critical incident technique. I collected and analysed cross-sectional and longitudinal data through (1) interviews, (2) archive data mining and (3) passive observation of practitioners' conferences, workshops and seminars. Finally, I drew inspiration from grounded theory (e.g., Corbin & Strauss, 1990, 2008; Glaser & Strauss, 2009), theory building from case study research (e.g., Eisenhardt, 1989a; Miles & Huberman, 1994) and process studies (e.g., Langley et al., 2013; Langley, 1999; Pettigrew, 1997) to analyse the data and extract results.

The explorative study: methods for data collection

Within the empirical context of FM services, the selected population for this dissertation was the Danish and Southern Swedish (Skåne) field of FM services. The purpose of such selection was to control for environmental variations and to clarify the domain of findings as framed around FM service stakeholders in Denmark and Skåne (Eisenhardt, 1989b). First of all, I carried out an explorative study. The explorative data collection was based on a combination of convenience and snowball sampling (Eisenhardt, 1989a). In other words, I selected interviewees from the part of population that was easy accessible (*convenience sampling*). In my case, this meant that the respondent were somehow in contact with the Centre for FM at the Danish Technical University, which co-funded my Ph.D. scholarship, and/or associated to the Danish FM Network. I then asked the first respondents to refer me to fellow practitioners (*snowball sampling*), whose work might be relevant to my research interests (Andriopoulos & Lewis, 2008; Eisenhardt & Bourgeois, 1988; Miles & Huberman, 1994). As I had no previous experience in the field of FM services, I approached the first steps of the explorative study with an open mind. I broadly set my initial research interest in the generic issue of *management of innovation processes within the FM service context*. The first interview guides were therefore rather inclusive and touched upon many aspects of innovation processes. This was also due to the fact that the FM specialised literature

had tackled this point only to a limited degree, as described in the section on the empirical context. I asked questions such as:

- *How does your organisation approach innovation and incremental improvements of the service offering?*
- *How are innovation and improvement processes usually managed?*
- *How has FM service provision changed throughout the last few years?*

The sample for the explorative study (Table 10) included the two main types of FM service practitioners, i.e., customers and providers. In total, the explorative study included 14 semi-structured interviews among 13 FM service organisations (at Company 9, Table 10, two interviews were carried out, with representatives of the global and local organisation respectively).

Table 10: Sample for the explorative study.

Company number	FM role	Core business	Number of employees	Position
1	Client	Financial services	32500	Head of Contract Management & IFM Development
2	Client	Logistics et al.	n.a.	Global Facility Management
3	Provider	Cleaning	300	CEO
4	Client	IT services	98000	Facility Manager
5	Provider	Hard FM services	8000	Market Manager
6	Client	IT services	430000	Real Estate Site Operations Manager
7	Provider	Hard FM services and FM consulting	6200	Senior Project Manager
8	Client	Industrial biotech	5500	FM Director
				FM Manager
9	Provider	Facility services	534500	Head of Knowledge Sharing and Engagement
				Commercial Director and CFO
				Segment Director
10	Provider	Real estate	370	Head of Operations
11	Provider	Technical FM	162000	Nordic Head of Projects
12	Client	Transportation services	5500	Facilities Manager
				Group Procurement Manager
13	Client	Telecom equipment	7500	Global Head of Facility Management

All interviewees on the client side shared the responsibility of managing the internal FM unit of the organisation they belonged to, and were in charge of the functioning of the innovation processes under investigation. On the other hand, the respondents on the supply side were all senior managers or directors, i.e., they had long-term experience with FM service provision and innovation. In addition, all providers but two (Companies 3 and 10) were working for one or more of the clients included in the sample. This ensured gaining both perspectives on the relationships and interactions between each pair of stakeholders.

The use of convenience and snowball sampling methods increases the risk of biases in the selected sample, but was considered appropriate given the explorative nature of the study and the broad initial focus (Miles & Huberman, 1994). The aim of the explorative study, in fact, was to

(1) better understand innovation processes within the FM service context, (2) investigate whether some specific issues would emerge from an heterogeneous sample of practitioners, so as to later on narrow down the focus of the research, and (3) gain *interactional expertise* (Langley et al., 2013). Interactional expertise supports studying people, subject matters and their context in meaningful ways. In fact, it helps connecting to specialists in ways that engage them in sharing what they know, its technical content and what is going on in the setting. I collected interactional expertise by learning the language and attitude of the practitioners in a field through the extensive contact that was embedded in the explorative study. Interactional expertise provides researchers access to, and appreciation of, specialists' views, activities and interests (Langley et al., 2013; Langley, 1999). In addition, the combination of convenience and snowball sampling allowed overcoming network limitations due to my novelty into the field (Eisenhardt, 1989b).

From explorative study to inductive, abductive and deductive studies: methods for data analysis

Not only did the explorative study head start my research in the FM service context, but, more importantly, it laid the empirical foundations for the three studies as the basis of papers 1, 2 and 4. The analysis of the explorative study, in fact, started along with the data collection. The semi-structured, explorative interviews were transcribed and uploaded in a dedicated database, along with archive data. To build, store and analyse the data I used the qualitative data analysis software Atlas.ti (v.6). Atlas.ti enables a very structured and systematic approach to coding, categorisation, interpretation and extraction of results. In my case, the analytical approach combined open and axial coding as inspired by grounded theory (Corbin & Strauss, 1990, 2008; Glaser & Strauss, 2009). In practice, I broke down the collected data to come up with abstract concepts that I associated to the incidents in the data (*open coding*). I then looked within and across the incidents for links between concepts, created categories and tested relationships between concepts and categories against the data (Corbin & Strauss, 1990; Miles & Huberman, 1994). In other words, through Atlas.ti I analysed interview transcripts and reports, as well as archive data, line-by-line. Throughout this process I created open codes and links between them (*axial coding*), and extracted printouts of codes and categories' networks that would ease the interpretation of results. This process was at the basis of all data analysis in this dissertation, including explorative and in-depth studies. An example of network printout can be seen in Figure 8. In the figure, boxes represent codes and arrows indicate relationships between codes, whose visual representation constitutes an intermediary step of the analysis of the explorative data. This implies that codes and links in Figure 8 are not necessarily discussed with the same terminology in the definitive presentation of findings.

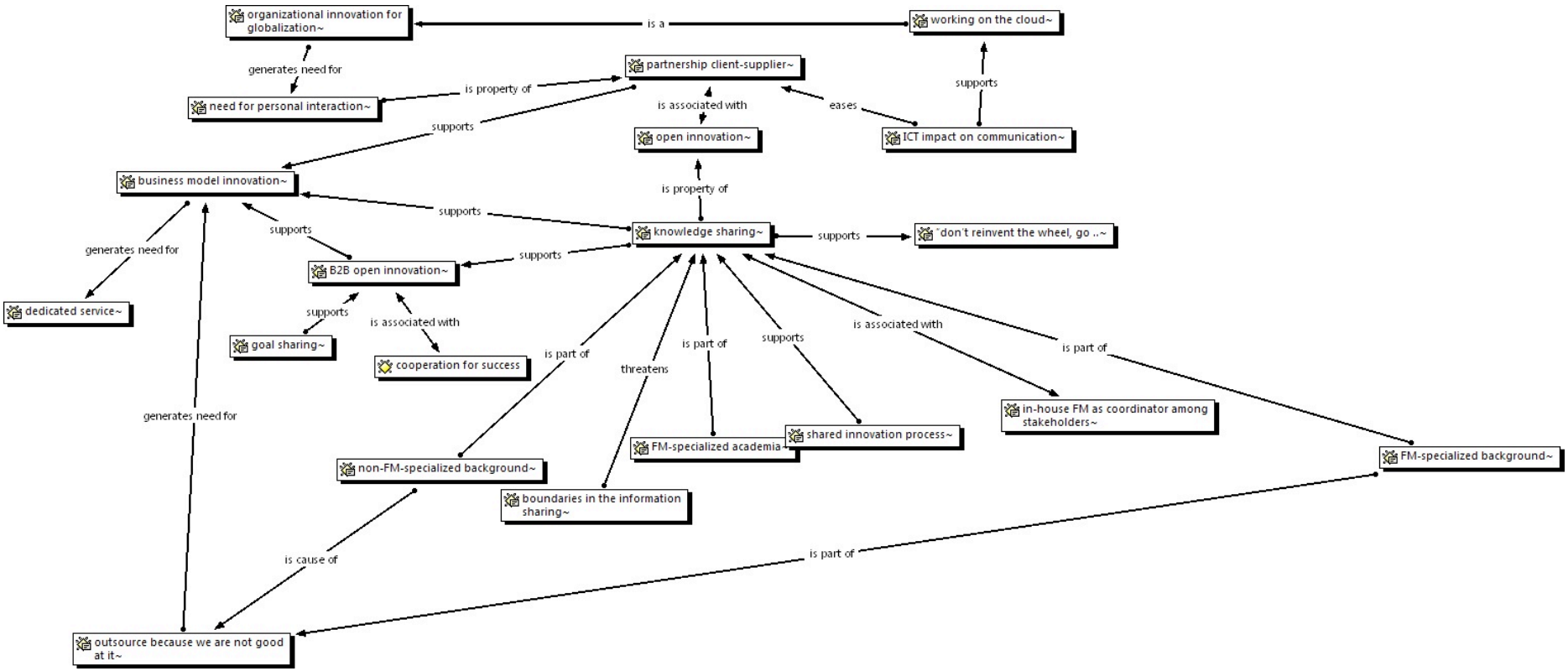

Figure 8: Example of network view for the analysis of explorative data.

As I did not apply grounded theory in its integrity throughout the work for this dissertation, I am not going to discuss this approach in detail. Nevertheless, I did draw inspiration from some of the grounded theory methods, such as coding and categorising. Moreover, the other approaches I built on in designing my study, i.e., theory building from case studies (Eisenhardt, 1989a) and process studies (Langley et al., 2013; Langley, 1999), both find their foundations in grounded theory. This makes it worthwhile to introduce the foundations of grounded theory and present how they were embedded in the research design for this dissertation. In Table 11 I therefore report the main canons and procedures of grounded theory (Corbin & Strauss, 1990, 2008) and briefly explain how each of them has inspired my empirical work.

Table 11: Principles of grounded theory and application thereof in this dissertation.

	Canons	Procedures	Inspired application in this dissertation
1	Data collection and analysis are interrelated processes.	The analysis begins as soon as the first bit of data is collected: all seemingly relevant issues must be incorporated into the next set of interviews and observations.	Coding did not only take place after the data collection was terminated, but also during the interviews themselves; the initial interview guide was continuously modified as relevant issues were emerging from the data.
2	Concepts are basic units of analysis	The incidents, events, and happenings are taken and analysed as potential indicators of phenomena, which are thereby given conceptual labels.	Incidents, events and happenings were abstracted and classified as concepts, constructs or phenomena through line-by-line open and axial coding. For instance, all examples of new services being developed were coded as "innovation in the service offering".
3	Categories must be developed and related.	Concepts that pertain to the same phenomenon may be grouped to form categories, which are more abstracts than the phenomena they represent and yet comprises the properties and dimensions of the phenomenon it represents. Over time, categories can become related to one another to form a theory.	Since the very first round of analysis, I created links and depicted relationships between codes, which allowed building networks of related codes, as well as spotting categories among the latter. For instance, different types of interactions between actors were categorised as "stakeholder interactions" and several links with the code "business model innovation" emerged, which is why I worked on paper 1.
4	Sampling in grounded theory proceeds on theoretical grounds.	Sampling does not proceed randomly or statistically, but rather based on the emerging issues that are derived from the analysis of the collected data.	While I did not carry out theoretical sampling in the explorative study in terms of the interviewees, I did adjust the interview protocol based on emerging issues to theoretical sample the collected data; later on, I applied theoretical sampling on both data and interviewees to go in depth on the issues emerged from the explorative study.

5	Analysis makes use of constant comparisons.	When an incident is noted, it should be compared against other incidents for similarities and differences.	For every incident, I visualised the network of related codes and compared between linked quotations before confirming codes and relations, to ensure grouping of like and only like phenomena, and always grouping like with like, i.e., to achieve greater precision and consistency.
6	Patterns and variations must be accounted for.	The data must be examined for regularity and for an understanding if where that regularity is not apparent.	When comparing between incidents being classified with the same code, I looked for patterns and variations to make sure differences would be highlighted in the networks of codes, so that each network would incorporate evidence of contrasting data.
7	Process must be built into the theory.	Process analysis means breaking down a phenomenon into stages, phases or steps, as well as highlighting purposeful actions in response to prevailing conditions.	In the explorative study, I classified different steps of innovation processes with different codes, and looked for relations with other steps to determine the progression of events.
8	Writing theoretical memos is an integral part of grounded theory.	There must be a system to keep track of all the categories, properties, hypotheses and questions that emerge from the analysis.	I wrote theoretical memos during the data collection as well as during the analysis, and made sure to consult them throughout the analysis process.
9	Hypotheses about relationships among categories should be developed and verified as much as possible during the research process.	As hypotheses about relationships between categories are developed, they should be taken back into the field for checking out and revision as needed.	I used the modified protocol guides to verify and confirm emerging relationships between categories, especially after the explorative study was completed, i.e., in the longitudinal case study and in the mini-case studies.
10	A grounded theorist need not work alone.	An important part of research is testing concepts and their relationships with colleagues who have experience in the same area.	I presented the work-in-progress analysis to several colleagues during seminars, workshops and informal conversations.
11	Broader structural conditions must be analysed, however microscopic the research.	The analysis of a setting must not be restricted to the conditions that bear immediately on the phenomenon of central interest.	During the explorative study, I asked both general and specific questions so as to ensure that responses mentioned and reflected upon the role of the surrounding environment and conditions.

Throughout the explorative study the relevance of stakeholder interactions emerged, which allowed me to narrow down the research focus. More specifically, three issues related to stakeholder interactions during innovation processes appeared as significantly relevant for the interviewed FM service practitioners. In fact, these three issues were repeatedly mentioned during the explorative interviews: (1) value co-creation; (2) tensions and conflicts between heterogeneous stakeholders; (3) management of stakeholder involvement. Not only the topics of papers 1, 2 and 4 emerged from the same explorative study, but they also share some of the data collection, from which the results were extracted. This is certainly a limitation due to potential biases in the collected data. To reduce the risk of biases I made sure to include additional, dedicated data for each of the studies, such as, for instance, the mini-case studies in paper 1. In

addition, I carried out separate data analyses, based on different methodologies, for the three studies.

The inductive, abductive and deductive studies: methods for data collection and analysis

Once I narrowed the research focus, I applied *theoretical sampling in course of research*, as illustrated in Figure 10 on page 82. This means that for the in-depth studies (mini case studies; in-depth longitudinal case study) I chose cases that were likely to replicate or extend the results that were emerging from the explorative data (Glaser & Strauss, 2009; Pettigrew, 1997). This way I could investigate the emerging issues in depth and strengthen replicability (Eisenhardt & Bourgeois, 1988). To implement reliable theoretical sampling, the selected cases should not differ consistently in their defining characteristics (Miles & Huberman, 1994). Theoretical sampling is in fact opposed to statistical sampling, in which researchers randomly select the sample from the population to obtain statistical evidence (Glaser & Strauss, 2009; Miles & Huberman, 1994; Yin, 2009).

First of all, in paper 1 I followed an *abductive approach* and used the construct of business model innovation to analyse the data on stakeholder interactions and value co-creation. Abduction is defined as *the integrated approach to research that aims at handling the interrelatedness of different elements in the research work* (Dubois & Gadde, 2002; Dubois & Gibbert, 2010; Van de Ven & Poole, 2005). By constantly moving back and forth from one research activity to another, and between empirical observations and theory, the abductive researcher is able to extend the understanding of both theory and empirical phenomena (Dubois & Gadde, 2002, p. 555). To collect more, deeper and richer data on the unfolding of value co-creation during innovation processes I selected three of the client companies from the sample in Table 10, i.e., Companies 1, 8 and 13, and carried out three mini case studies (Weill & Olson, 1989). Based on the principles of theoretical sampling (Eisenhardt & Bourgeois, 1988; Glaser & Strauss, 2009; Pettigrew, 1997), the companies that were selected for the mini case studies have in common the following characteristics:

1. Their core business is not FM services, hence they are demand stakeholders of FM service providers;
2. They are multi-national organisations. FM services are provided mostly on a local basis, although there is a certain degree of coordination on the international level;
3. They implement a combination of in-house and outsourced FM service provision. In-house provided services include investment, financial, and space FM services, while operational and soft services are outsourced (see classification in Figure 5 for the exact set of services in each of the five categories mentioned here);

4. They have an internal FM unit that is charge of FM service provision. More specifically, the FM units are in charge of (1) provision of space-related services, and (2) management of the relationships with the outsourced providers for operational and soft services. The FM units also control investment- and financial-related FM services in cooperation with the units that are dedicated to the management of finance and accounting;
5. The internal FM units interact with internal and external stakeholders, including outsourced providers, consultants and academics when managing innovation processes.

Nonetheless, the selected companies also entailed two main differences, which in fact might support the evaluation of generalizability of the findings (Miles & Huberman, 1994; Yin, 2009). First of all, the core business of the three companies lies within different fields, i.e., financial services (Company 1), industrial biotechnology (Company 8) and telecommunication equipment (Company 13). Second, the combination of in-house and outsourced FM services differed at the time the study was carried out. Company 1 had several outsourced suppliers and two internal units, each of which responsible for a set of FM services. However, it was on the way of creating an integrated FM contract, thereby hiring one single, integrated supplier to take care of all outsourced FM services (operational and soft services). Company 8 had also hired a combination of outsourced suppliers, but only one unit dedicated to all FM services. Company 13, on the other hand, is characterised by one FM unit that manages the relationships with one integrated and outsourced provider of FM services.

The mini case studies complemented the explorative interviews with eight semi-structured, in-depth interviews for a total of approx. 12,5 hours and archive data collection. The interview guides for the in-depth interviews were built with the aim of collecting more details and critical incidents on stakeholder interactions during innovation processes within the FM service context. The constant comparison of theory and data was crucial for the identification of pattern of relationships among the concepts that arose throughout the interviews. The need for theory evolved throughout the research process, and was characterised by several episodes of *re-direction* (Dubois & Gadde, 2002). Through re-direction, i.e., iteration between data and theory, I identified the best analytical framework to address the research question. In other words, the matching between the explorative study and existing literature allowed narrowing down the research focus to value co-creation through business model innovation while the investigation progressed. The literature search, in fact, enabled the identification of business model innovation processes as a proper lens to address those issues; and from the selection of existing literature an analytical framework of reference was designed (Dubois & Gadde, 2002; Dubois & Gibbert, 2010). In addition, I used *visual mapping* to develop and verify emerging theories by creating visuals that would represent intermediary steps between the raw data and more abstract conceptualisations (Langley, 1999). Visual mapping involves the manipulation of data into

graphical form that include diverse dimensions to show precedence, parallel processes and the passage of time (Langley, 1999). To strengthen the theoretical validity of the study, line-by-line open and axial coding was carried out systematically. This analytical process was based both on the constructs that emerged from the data and those that I derived from the analytical framework of reference (Corbin & Strauss, 1990; Eisenhardt, 1989b; Miles & Huberman, 1994). Table 3 in paper 1 represents a simplified example of how axial coding was used in practice for the analysis: the two dimensions of the framework (business model elements and phases of the business model innovation process) include the 12 categories that were used to classify the critical incidents. Before being inserted into the table, the critical incidents went through open and axial coding to be conceptualised and categorised. Furthermore, the iteration between data and theory allowed identifying an additional dimension, which was then added to the framework. This additional dimension constitutes one of the main contributions of the paper.

Secondly, paper 2 is built on an *inductive methodology*, which is based on Eisenhardt's (1989a) guidelines for building theories from case studies and inspired by process strategies (Langley et al., 2013; Langley, 1999). Induction is defined as *the approach to research based on which theory is built from empirical phenomena* (Eisenhardt, 1989a; Miles & Huberman, 1994; Yin, 2009). In inductive approaches, the empirical grounding of theoretical notions lies on coding procedures (Corbin & Strauss, 1990, 2008; Dubois & Gibbert, 2010; Glaser & Strauss, 2009). To investigate the unfolding of tensions and conflicts between heterogeneous stakeholders during innovation processes in services, I collected rich and varied process data through in-depth interviews and data mining on the internal FM unit of Novozymes (Company 8 in Table 10). Novozymes is a large Danish, multi-national organisation (6200+ employees), whose core business lies within industrial bio-technology with a strong focus on enzyme production (Novozymes, 2013). The data collection for the in-depth case study interested the internal FM unit and its main stakeholders, i.e., (1) the organisation, i.e., Novozymes as a whole, which is supported by such unit; (2) its employees, who are served by Novozymes FM unit; and (3) the outsourced providers. The service providing under investigation was examined over a time period of eight years from the foundation in 2005 until 2013 through a longitudinal, in-depth case study (Langley, 1999). The longitudinal case study focused on the organisational development of the internal FM unit of Novozymes. The longitudinal perspective allowed examining the relationships and exchanges—including tensions and conflicts—between stakeholders during innovation processes at different stages of the organisational development of the focal internal FM unit (Drori & Honig, 2013). Furthermore I applied *temporal bracketing* to the longitudinal data (Langley, 1999, p. 703) and combined it with the critical incident technique to reveal the interactions mechanisms in innovation processes in services. Theoretical bracketing involves deconstructing data into successive adjacent periods that transforms a shapeless mass of process

data into a series of more discrete but connected blocks (Langley, 1999, p. 703). In practice, I divided the longitudinal case in four periods so that I could focus on the stakeholder interactions that took place in each period. Each period corresponds to a critical incident as identified by respondents. By doing so, I was able to apply *process decomposition by replication*, which implies that I could turn a longitudinal case study into an embedded case study. Process decomposition by replication allows identifying comparative units of analysis within a stream of longitudinal data. This, in turn, enables the researcher to examine the recurrence and accumulation of progression (Langley et al., 2013). Again, I used visual mapping to develop and verify the emerging theory (Langley, 1999). A practical example of how I combined these research strategies to analyse my data and extract results can be found in Table 2, paper 2. In this table the four periods of the development of Novozymes' FM unit are organised in a simplified visual mapping. By using the table I compared the four periods among each other and with a single, representative innovation in the service offering. For each incident I extracted the empirical instances that I had associated to concepts during open and axial coding. I then compared how the concepts were associated with each other within and across incidents to develop model that constitutes the main contribution of the paper.

Throughout the research process that I carried out for both paper 1 and paper 2, the data analysis actually overlapped with the data collection (Corbin & Strauss, 1990; Eisenhardt, 1989a). I collected field notes, in form of interview reports and memos, during and after the interviews, as well as during and after other encounters with practitioners, such as conferences, workshops and seminars. I included the interview reports into the database, and analysed them through line-by-line coding as I did with interview transcripts and archive data. On the other hand, I used field notes and memos from interviews and passive observation (see Figure 10 on page 82) to guide the line-by-line coding (Glaser & Strauss, 2009). At the same time I carried out a *flexible data collection*, whose reliability is grounded in the systematic implementation (Eisenhardt, 1989a). The flexibility in the data collection aimed at (1) better grounding of the theory and (2) providing new theoretical insight. Specifically, the flexible data collection included adjustments in (1) the interview protocol, based on the emergence of critical themes; (2) the sources of data, e.g., additional in-depth interviews based on theoretical sampling, when the data highlighted relevant (similar or contrasting) evidence to the main case(s) (Eisenhardt, 1989a).

Thirdly, the explorative study included evidence of the tools that are used to proactively involve demand stakeholders of FM service in innovation processes. Therefore, in paper 4 the interviews and archive data from the explorative study were complemented with additional material on the same issue. Specifically, we added some comparable interviews that the co-author had carried out and the in-depth interviews from the mini-case studies that mentioned tools for stakeholder involvement. We then carried out a *deductive analysis* and derived a typology of

stakeholder involvement methods for innovation within the context of FM services. Deduction is defined as *the research approach that uses existing theory to build the frame through which empirical phenomena are investigated and new theory is derived* (Dubois & Gadde, 2002; Dubois & Gibbert, 2010; Miles & Huberman, 1994; Yin, 2009). The frame, through which empirical phenomena are analysed, consists of a set of hypothesis and/or propositions that might be combined in an analytical framework. Such framework, based on existing theory, is then used as a lens to investigate how existing theory applies to reality, and which aspects of the empirical phenomena can be uncovered to derive new theory (Miles & Huberman, 1994).

Finally, Paper 5 requires a separate note, as I did not carry out the data collection myself. The 17 semi-structured interviews that constitute the empirical foundation of the study were in fact collected by my co-authors, with whom I have collaborated to design an appropriate theoretical framework for the analysis and extract results. Nonetheless, papers 4 and 5 share the deductive approach to data analysis. In these two studies, in fact, we analysed the data deductively by using set conceptual frameworks. The frameworks were based on theories respectively on the involvement of users within innovation processes and on the unfolding of collaborative innovation within public-private partnerships in FM services. In practice, we reviewed existing research to build frameworks, under whose categories we classified the incidents and phenomena in the data.

All the collected data, from the explorative as well as from the in-depth studies, went through *within-* and *cross-case analysis*. The analytical approach was based on Eisenhardt's (1989a) guidelines to search within and cross-case patterns as well as Langley's strategies for theorising from process data (Langley et al., 2013; Langley, 1999). For instance, I visualised printouts of networks derived from open and axial coding by using a dedicated tool in Atlas.ti. Such tool allows to open up networks of codes and categories and to compare all quotations from different interviews or archive documents that are associated to each code. Atlas.ti, in fact, enables the visualisation of all quotations associated to each code at the same time. This, in turn, eases the comparison of different critical incidents within the same case or across cases.

To clarify this analytical procedure, Figure 9 reports an example of category network, which, specifically, was one of the intermediary steps of the analysis carried out for paper 1 (meaning that it might not reflect the same terminology of the definitive paper). As in Figure 8, the boxes in Figure 9 represent concepts and the arrows indicate relationships between codes. Since Figure 9 is a category network, it shows all concepts associated to a specific category, in this case *Business Model (BM) content*. Thanks to the functionalities of Atlas.ti, I was able to visualise a pop-up window that reported all the quotations associated to each box in the network view.

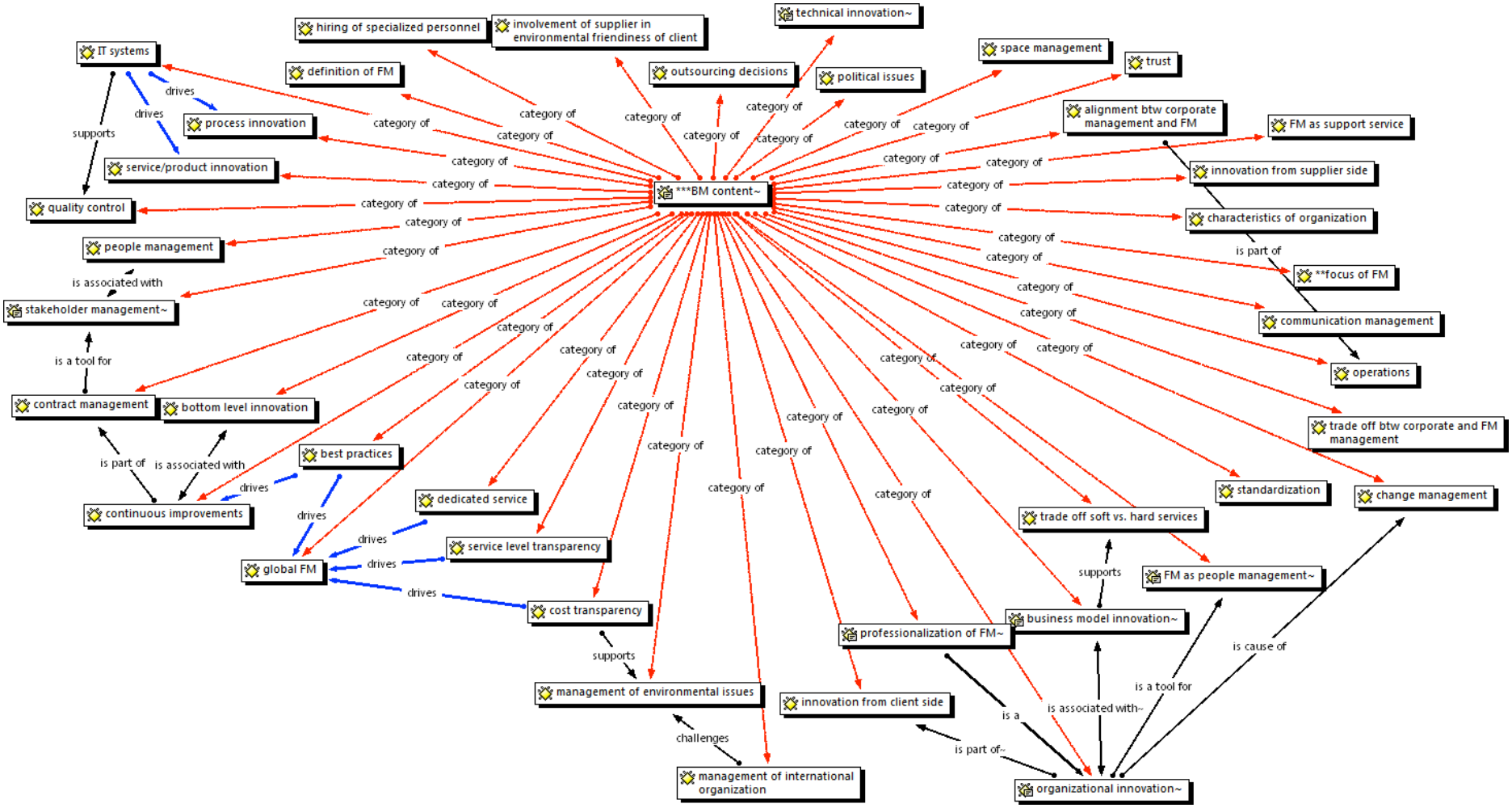

Figure 9: Example of category network for the analysis of data in paper 1 (Category: Business model content).

To ensure a close fit between data and theory, I iteratively compared the constructs that emerged from the data with existing literature and theories (Eisenhardt, 1989a). Iterative comparison of data and theory, in fact, strengthens internal validity, ensures consistency of relationships within and across cases, and supports abstracting from the particular to the general. The open and axial coding that I carried out in all studies was based both on the constructs that emerged from the data—i.e., *in vivo coding*—and on those derived from existing literature—i.e., *theoretical sensitivity* (Corbin & Strauss, 1990; Miles & Huberman, 1994). Moreover, I combined:

1. *Sharpening of constructs*, which involves refining constructs based on existing theory and building evidence that confirms the theoretical grounding of such constructs.
2. *Verification of constructs*, which involves examining each potential relationship between codes for each case and not for the aggregate case, and then verify them through *replication logic* (Eisenhardt, 1989a). Replication logic refers to the logic of treating a series of cases as a series of experiments with each case serving to confirm of disconfirm the hypotheses (Yin, 2009).

In practice, the first relationships between constructs emerged from the explorative study, and were refined with literature at the beginning of the data collection for the in-depth studies. Evidence for the constructs was then built through dedicated data collection in the longitudinal case (sharpening of constructs). Afterwards, the constructs and relationships that emerged from the in-depth, longitudinal case study were examined through replication logic across the four periods and compared with existing literature (verification of constructs).

Furthermore, to enhance internal validity and generalizability I compared my results with conflicting and similar findings in existing literature and theories (Eisenhardt, 1989a). The comparison between my results with those of previous research is presented extensively in the *Discussion* section of each paper and in the *Conclusions* of this synopsis.

Finally, I combined the guidelines by Eisenhardt (1989a) and Langley (1999) for reaching closure. In the explorative study, for instance, I stopped collecting data when I felt I had reached *theoretical saturation* (as shown in Figure 10 below). Theoretical saturation implies that the incremental learning on the processes under investigation is minimal (Eisenhardt, 1989a). In the in-depth longitudinal case study, similarly, I derived the four periods from temporal bracketing, and stopped collecting data on the processes based on a combination of pragmatic considerations (issues related to time and financial resources) and saturation (Langley, 1999). The last interviews, in fact, did not offer significant contribution to the emergent theory on stakeholder dialectics. Also the interaction between data and theory was interrupted when saturation was reached, i.e., when additional literature did not significantly contribute any further to the emergent theory (Eisenhardt, 1989a; Langley, 1999).

Figure 10 visualises the overall approach to data collection and analysis, and emphasises the different sources of data interpretation thereof (grey ovals). Again, the process is represented as linear to ease understanding, although in practice the different phases overlapped. The arrow between theory and coding is bi-directional to represent that theoretical sensitivity was achieved through an iterative process.

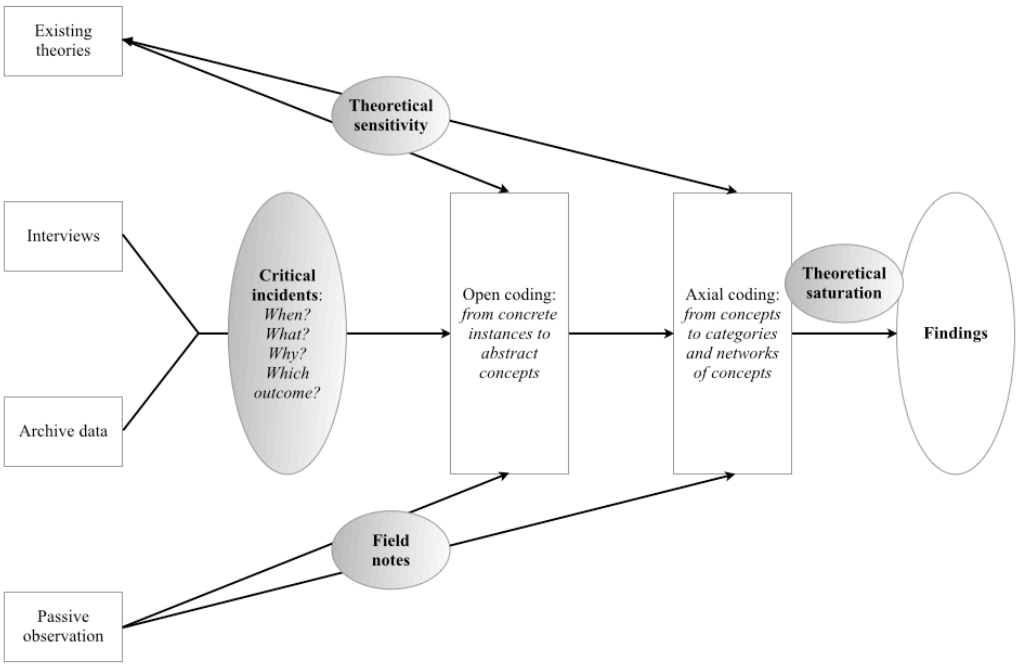

Figure 10: Sources of data and interpretation thereof.

Evaluation of results

The results from qualitative research can be evaluated in terms of *generalizability* and *validity*, although the debate over the use of these two criteria is still vivid. In this dissertation I use these two constructs to reflect on the evaluation of my results, and incorporate the debate on their usability by providing a reflected definition of the two criteria. In this sub-section, in fact, I present the definition of generalizability and validity as applied here, and assess the generalizability and validity of my results.

Generalizability of results

Broadly speaking, generalizability refers to *the applicability of a theory in a setting that is different from the one in which it was empirically tested and confirmed* (Lee & Baskerville, 2003). This definition includes *statistical generalizability*, which corresponds to the ability of the investigated sample to represent a population (Miles & Huberman, 1994; Yin, 2009). Nonetheless, it also embeds other interpretations of generalizability. This broader meaning, therefore, incorporates the discussion on the use of the term for qualitative research. Moreover, it makes it feasible to use different types of generalizability to evaluate diverse research approaches. Lee and Baskerville's (2003) definition of generalizability is thus the one that is applied here.

Along with the above-mentioned definition, Lee and Baskerville (2003) proposed a framework to distinguish between generalizability:

1. From data to description;
2. From description to theory;
3. From theory to description;
4. From concepts to theory.

The two research approaches that are adopted in this dissertation relate to two types of generalizability: (1) from description to theory (papers 1, 2, 4 and 5); and (3) from concepts to theory. On one hand, generalizability from description to theory corresponds to what Yin (2009) presents as *analytical generalisation*. Analytical generalisation refers to *the abstraction of results from the empirical material to a general level* (Yin, 2009). In other words, the researcher generalises from empirical statements, which are the inputs of the generalisation, to theoretical statements, which are the outputs of the generalisation. This type of generalizability is the one associated to the empirical research that I conducted for this dissertation (papers 1, 2, 4 and 5). In fact, my empirical work is grounded on (1) theoretical sampling and on (2) the systematic abstraction of theoretical constructs from empirical material through several rounds of coding (Corbin & Strauss, 1990, 2008; Eisenhardt, 1989a; Glaser & Strauss, 2009).

As mentioned above, theoretical sampling was aimed at choosing cases that were likely to replicate or extend the emergent theory, and not at obtaining statistical evidence. Therefore, by combining the principles of grounded theory with the guidelines of Eisenhardt, I aimed for generalizability (Lee & Baskerville, 2003), or, better said given the nature of my empirical work, *versatility* (Poole et al., 2000). Versatility is *the degree to which an explanation and/or theory can include a broad domain of context without modification of its essential character* (Poole et al., 2000). In other words, a versatile process explanation and/or theory can stretch or shrink to fit specific cases in various context and at different points in time (Van de Ven & Poole, 2005). Rather than being generalizable in statistical terms, in fact, the overall results of my empirical

research can be considered as versatile. In fact, they were extracted in a way that supported their applicability beyond the investigated cases and at least within the boundaries of the FM service sector. In addition, the results might be applied to other service context that share the same characteristics of FM services, i.e., other task-interactive services (Mills & Margulies, 1980). More specifically, versatility was aimed for during the whole research process (1) by using theoretical sampling; (2) through a very systematic approach to data collection and analysis aided by using Atlas.ti and (3) by extensively describing the methods for data collection and analysis, so that other researchers could replicate the research process (Corbin & Strauss, 1990, 2008; Eisenhardt, 1989a; Glaser & Strauss, 2009). Such guidelines have been, throughout the years, accepted as reliable for achieving generalisation from empirical descriptions to theory (Lee & Baskerville, 2003), which is why they were followed here.

On the other hand, when generalising from concepts to theory, researchers generalise from theoretical propositions in form of concepts, such as variables, to a set of logically consistent propositions that, pending the results of empirical testing, could qualify as a theory. Another form of generalising from concepts to theory would be *the formulation of a theory based on the synthesis of ideas from a literature review* (Lee & Baskerville, 2003). This last form of generalisation is what I implemented in paper 3 to derive the conceptual typology in Figure 13 (page 95, in the Summary of findings). Lee and Baskerville (2003) say that there are presently no criteria for assessing the capability of variables, constructs, or other concepts to be generalised or otherwise developed into a theory. Similarly, Webster and Watson (2002, p. xx) underline that the evaluation of such theoretically-based outcome is difficult and nebulous. While some argue, for instance, that good theories should be memorable and provide answers to why, other stress that they should be interesting, yet parsimonious, falsifiable, and useful (Weick, Sutton, & Staw, 1995). Nonetheless, Webster and Watson (2002) suggest having colleagues read and comment on the work and achieve maturity through frequent revisions (Webster & Watson, 2002). Following their suggestion, I presented working versions of paper 3 in several collegial venues to collect feedback, including the Scandinavian Conference on Information Systems (SCIS) 2012, before I submitted it for publication.

Validity of results

While the notion of generalizability is associated to consistency, within quantitative research validity refers to whether the intended object of a measurement is actually measured (Miles & Huberman, 1994; Yin, 2009). In qualitative approaches, no measurement takes place. Therefore, the notion of validity is associated to the quality of data, and depends on whether the research approach well fits the purpose of the study (Stenbacka, 2001). In other words, qualitative research is considered valid when it is plausible, trustworthy and, therefore, defendable (Johnson, 1997). One of the main threats to validity in qualitative research is the *researcher bias*. Researcher biases

typically arise when the data collection and analysis are selective, i.e., when they are influenced by the researcher's opinion on the investigated issues, and might thus be challenged through reflectivity of the researcher him-/herself (Johnson, 1997).

In my case, the risk of researcher bias was centred on my background as M.Sc. in management and economics of innovation and technology. This meant a rather extensive knowledge of theories of innovation, with the correlated risk of limiting to what theories would postulate (1) the answers of my respondents, (2) the nature of observations and (3) the scope of archive data collection. On the other hand, I had no previous experience in the FM service sector, which left me free of pre-conceptions about what innovation might be about within this context. To reduce the risk of researcher bias and strengthen validity, I started my empirical work with the explorative study. During this phase, both for data collection and analysis, I forced myself to keep an open mind: for instance, I asked very general questions to my interviewees and let them free to argument on broad topics (yet somehow related to innovation). Thereby, I aimed at avoiding influencing their answers with my preconceptions. I then narrowed down the scope of my research by identifying those issues that appeared as most relevant to practitioners, based on the collected data. This process is reflected in the heterogeneity of the papers that are included in this dissertation. In fact, as I was starting up the explorative study, I carried out the literature review of paper 3. My initial interest was actually on the role of ICT within innovation processes in services. Nevertheless, interactions between stakeholders emerged from the explorative study as a more general issue that was relevant for practitioners, as well as yet under-researched within the literature on innovation processes in services. The scope was therefore narrowed as presented in this synopsis.

Furthermore, I applied dedicated research strategies to strengthen validity, as depicted while presenting the research design. For instance, I used the explorative study to collect interactional expertise, and gain a closer understanding of practitioners' language and attitudes. Interactional expertise supports *interpretative validity*, which is defined as the accurate interpretation of the meaning of respondents' statements (Johnson, 1997; Langley, 1999). At the same time, I systematically iterated between data and theory (Dubois & Gadde, 2002) and used peer reviews as well as recurrent discussions on my results with colleagues (Webster & Watson, 2002; Weick et al., 1995), both in Denmark and abroad. In turn, this was meant to support *theoretical validity*, i.e., the degree to which a theoretical explanation fits with data and is therefore credible and defendable (Johnson, 1997).

Finally, *internal validity* is the degree to which a researcher is justified in concluding that an observed relationship is causal (Cook & Campbell, 1979). To strengthen internal validity I combined the systematic iteration between data and theory with within- and cross-case analysis (Eisenhardt, 1989a). The use of different sources of data, such as explorative and in-depth

interviews, archive data and passive observations, was also meant to support internal validity (Johnson, 1997; Miles & Huberman, 1994; Yin, 2009). Furthermore, I discussed my preliminary and final results with the interviewees from Companies 8, 12 and 13 (as well as with other practitioners) in several occasions. The purpose of these discussions was twofold. On one hand, discussing preliminary results with practitioners was meant to support the extraction of more reliable findings by comparing my interpretation of the relations between concepts with those of my respondents throughout the theory building. On the other hand, discussing the final outcomes aimed at strengthening internal validity by verifying whether practitioners could relate to the outcomes that I obtained from my investigation.

RESULTS, DISCUSSION AND CONCLUSION

This last section of Part I outlines the overall conclusions of this dissertation. First, I present the key results, thereby summarising the findings of each individual paper that is included in Part II. Secondly, I discuss theoretical contributions and practical implications. Finally, I draw concluding remarks on limitations and agenda for further research.

Summary of findings

In the introduction of this synopsis, I stressed the importance of paying attention to the interactions between stakeholders when investigating and managing innovation processes, and even more so in the service context. Throughout the Ph.D. project, I have reviewed existing literature and carried out several rounds of data collection and analysis in the empirical field of FM services. I adopted a variety of approaches and perspectives to reach the umbrella aim of investigating how interactions between stakeholders unfold throughout innovation processes in services, and how service organisations and their stakeholders navigate and manage such unfolding to reach successful outcomes. Under such umbrella aim, I tackled some specific aspects of stakeholder interactions throughout innovation in processes in services. Such aspects include: (1) the unfolding of value co-creation throughout processes of open business model innovation in services; (2) the unfolding of tensions and potential conflicts between heterogeneous stakeholders throughout processes of innovation in services; (3) the relationship between innovation in services and ICT; (4) the proactive involvement of heterogeneous stakeholders, and related support tools, throughout innovation processes in services.

Overall, this dissertation stresses the role of stakeholder management for the success of innovation processes, and outlines a series of methods and tools that might support dealing with heterogeneous parties when aiming for innovation. Furthermore, and perhaps more interestingly, this work underlines that interactions between stakeholders are, in fact, one of the driving and characterising elements of innovation processes in services. In short, the organisation trajectory, i.e., the development over time of the business model of an organisation, is dependent on changes in the business model of its stakeholders (Nardelli, 2014b). But interactions between stakeholders play a crucial role in all types of innovation processes, not only business model innovation: tensions and conflicts between diverse parties, in fact, are one of the driving forces behind innovation processes in services (Nardelli, 2014a). Therefore service organisations should carefully identify and, when possible, select their stakeholders to maximise the potential of interactions. Moreover, service organisations should evaluate how each set of stakeholders should be involved in different types of innovation processes, and manage interactions through change

and expectation management (Nardelli et al., 2015; Nardelli & Scupola, 2013; Nardelli, 2014a, 2014b).

More specifically, the four research objectives were reached as follows.

Research objective 1: To investigate the unfolding of value co-creation throughout processes of open business model innovation in the service context

On one hand, the findings suggest how innovating the way a service organisation creates, delivers and captures value—i.e., innovating its business model—might actually depend on the relationships between and among stakeholders. The relations between stakeholders, in fact, evolve over time through the development of personal relationships, trust and better awareness of each other. As the relationships and interactions between stakeholders develop, the different parties influence each other's development to obtain the best possible results for all (Nardelli, 2014b). In other words, the business model innovation process of a service organisation and interactions with its stakeholders are intertwined, and influence each other's development as different parties interact to reach to the common goal of co-creating value.

Research objective 2: To investigate the unfolding of tensions and potential conflicts between heterogeneous stakeholders throughout processes of innovation in the service context

On the other hand, the dark side of interactions, i.e., tensions and conflicts between stakeholders, appears not only to be intrinsic in innovation processes in services, but also to play a crucial role in triggering innovation processes and influencing their unfolding (and related management). Tensions and conflicts, more specifically, unfold because of the mismatch between the needs and expectations of diverse parties. Their resolution constitutes a step forward towards innovation. In short, the misalignment of needs and expectations triggers a dialectic mechanism, whose outcome feeds back into the innovation process. Each dialectic outcome, or resolution, in fact, brings change into the system, thereby creating a situation in which the needs and expectations of some stakeholders are satisfied, while those of other parties are not. The imbalance between the satisfaction of needs and expectations of the different stakeholders creates a new tension, whose resolution, in turn, brings the process further (Nardelli, 2014a). This dialectic is not a linear process, but rather a recurrent and overlapping mechanism that depicts what happens behind each phase, step and even single activity of an innovation process, thereby enriching our understanding of innovation.

Research objective 3: To investigate the relationship between innovation in services and ICT

Previous literature did to a certain degree recognise the role of stakeholder interactions within innovation processes in services, and investigated the methods and tools to support successful practices. However, it mostly focused on single units of change and adopted a firm-centric perspective on service providing organisations (see, e.g., Alam, 2002, 2011, 2012, 2013; Bitner et al., 2008; Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011). In the attempt to extend such perspective, this dissertation also sought to uncover the point of view of demand stakeholders, i.e., clients, customers and end users, on their very own involvement. To begin with, a systematic literature review reveals the features of the relationship between innovation in services and ICT, a set of technologies that has been shown to support the management of interactions between stakeholders. Innovation in services and ICT were found to be inter-dependent. This means that innovation and ICT influence each other in their development: it is not only ICT that supports innovation in services, but actually the implementation of innovation in services triggers improvement and innovation processes in ICT as well (Nardelli, 2015).

Research objective 4: To investigate the proactive involvement of heterogeneous stakeholders, and related support tools, throughout innovation processes in the service context

The empirical findings of this study also indicate that internal FM units of organisations, whether they belong to the private or the public sector, play a crucial intermediary role in supporting third party service providers that wish to involve clients and end users in their innovation processes (Nardelli et al., 2015; Nardelli & Scupola, 2013). Moreover, the results suggest that the involvement of stakeholders might be supported through a variety of face-to-face and ICT-based tools, such as, for instance, dedicated workshops and online idea competitions. Such tools, however, should be matched according to the specific role that each party plays with regards to innovation and to the sought type of involvement (Nardelli & Scupola, 2013). In other words, to involve stakeholders in innovation processes, it is important that service organisations clearly identify their stakeholders and map their needs and expectations, to then reflect upon the degree of involvement they want to pursue and decide the support methods and tools accordingly. For instance, carrying out a competition to collect suggestions on how to innovate the service offering is a useful tool to involve end users in the idea generation step of new service development. In fact, end users are the individual stakeholders that benefit from the service provision directly, and therefore know well how services are provided on a daily basis. They might therefore have realistic and useful ideas on how they could be improved. On the contrary, using an idea competition would not work well to involve the clients, i.e., the representatives of the organisation as a whole. The clients, in fact, are concerned with the overall well-being of the

entity they manage and represent, rather than on the single services that are provided to ensure such well-being. Involving clients through a competition for idea generation would not support the innovation process, while their active participation is crucial when developing, for example, the strategic planning and budget of the service offering in its integrity.

To depict the outcomes of the study behind this dissertation more precisely, the following paragraphs are dedicated to the individual papers in Part II and summarise the main findings of each of them.

Paper 1: Value co-creation and business model innovation in services

Paper 1 sets out to investigate interactions between stakeholders during process of innovation by uncovering the unfolding of value co-creation throughout processes of open business model innovation in the service context. According to recent research on open innovation, in fact, the continuous innovation of the business model behind service offerings is as important as the innovation of the service itself. In addition, it should be implemented with an open approach, i.e., by continuously interacting with stakeholders (e.g., Chesbrough, 2011; Teece, 2010). At the same time, service-focused literature depicts new ways of thinking about innovation and stresses the importance of investigating, among other types of innovation, business model innovation, a yet under-researched issue for what concerns services (Carlborg et al., 2014; Rubalcaba et al., 2010; Toivonen & Tuominen, 2009). To overcome the firm-centric view that characterises the majority of literature on innovation in services (Nardelli, 2014a) and to tackle multiple units of change, in this paper I adopt the perspective of the service-dominant logic. I thus investigate how FM service stakeholders interact with each other and integrate resources to co-create value through business model innovation processes. By adopting a process perspective to value co-creation and taking business model innovation processes as unit of analysis, this paper confirms that business model elements are interdependent over time (Achtenhagen et al., 2013; Amit & Zott, 2012; Demil & Lecocq, 2010; Mäkinen & Seppänen, 2007; Morris, Schindehutte, & Allen, 2005; Zott & Amit, 2010). In addition, it outlines that business model innovation processes are heavily linked to stakeholder interactions, as the business model innovation processes of stakeholders are intertwined.

In short, the study behind this paper suggests that, in FM services as well as in other task-interactive services, interactions between stakeholders go beyond cooperation and towards value co-creation. The business model innovation process of service organisations appears to be overlapping and rather fluid. Nonetheless, a time-based business model innovation framework allows depicting how:

1. Changing one of the elements of the business model of the focal organisation—in this study, the FM unit—triggers changes in the business models of its stakeholders;

2. The business model innovation process of an organisation is not only determined by endogenous decisions, but also by changes in the business models of its stakeholders.

Value is co-created by and for all stakeholders when there is a match between (1) the innovated business model of the internal FM function; (2) the corporate business model; and (3) the business models, needs and expectations of other external actors, such as suppliers, consultants and fellow clients, who play a role in the value co-creation. I thus propose a conceptual framework (Figure 11) that incorporates the unfolding of value co-creation through the intertwining of business model innovation processes of a focal organisation (on the x-axis) and its stakeholders (on the y-axis) over time (on the z-axis). In other words, the framework depicts how service providing organisations not only interact with each other through co-production, but actually co-create value over time by dealing with the interdependencies between their own business model and the ones of their stakeholders, i.e., throughout open business model innovation processes.

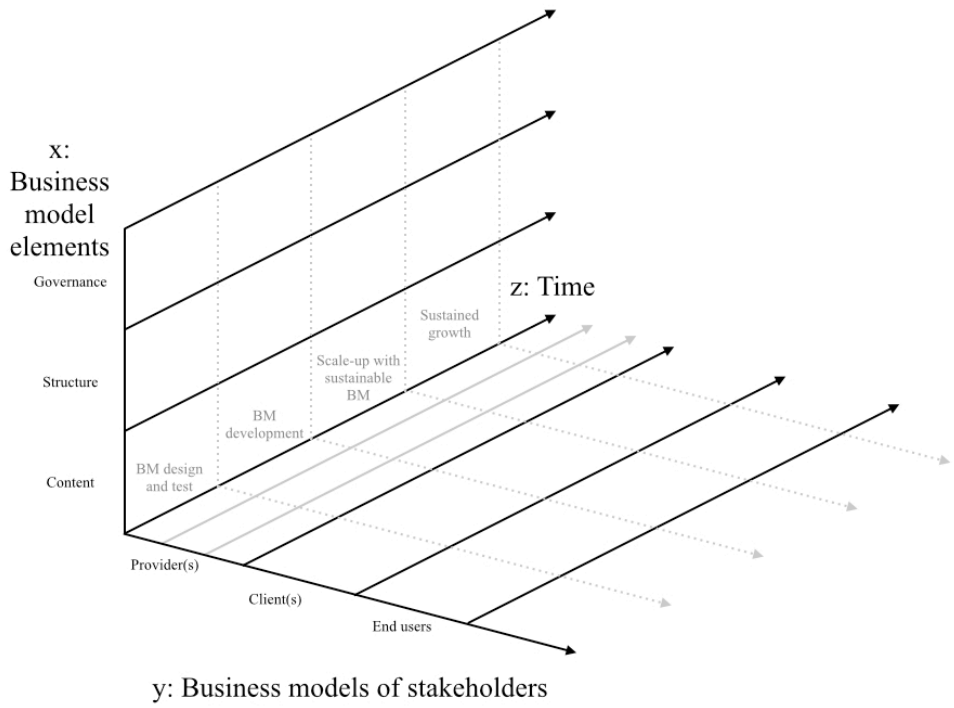

Figure 11: Conceptual framework – Interdependencies of business model innovation processes in services.

Based on these findings, the paper outlines that, within the service industries, value co-creation unfolds through open business model innovation processes. This happens as relationships between and among stakeholders evolve along with the business model, through the development of reciprocal trust, personal relationships, and better awareness and understanding of each other's business model. In other words, value co-creation requires *dynamic and interactive consistency*, i.e., each organisation must be attentive to changes in business models of other entities to prepare

for proper reaction. Most importantly, dynamic and interactive consistency extends beyond reaction, as interactions with stakeholders and close cooperation may be organised strategically to involve the right actors for each specific stage of the business model innovation process.

Paper 2: Stakeholder dialectics and innovation in services: A process perspective

Paper 2 addresses the issue that interactions between stakeholders have been presented as collaborative in the literature on innovation in services (e.g., Alam, 2002; Bitner et al., 2008; Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011). Overlooking tensions and conflicts that arise during innovation processes, and presenting collaboration between different parties as collaborative and an easy-to-handle exercise is dangerous, as it might create a masked picture of reality. This causes misunderstandings for practitioners, but also limits the theoretical representation of innovation practices. To overcome the shortcomings in existing literature on innovation processes in services I investigate how and why tensions and potential conflicts between heterogeneous stakeholders unfold during processes of innovation in services. By taking tensions and conflicts between stakeholders as a unit of analysis, I follow the emergent relationships between the development of such disagreements and the development of innovation processes over time.

A recurring finding in the collected data is that, when a change, caused either by an exogenous shock or an endogenous decision, is introduced into the system, it challenges the status quo, i.e., the balance between needs and expectations of different stakeholders that was previously achieved. As a consequence, each set of stakeholders needs to deal with issues, needs and expectations that might be very different from their own, which, in turn, causes tensions between parties. Such tensions trigger a dialectic motor of change, which I call *stakeholder dialectics*. Stakeholder dialectics is defined as a constructive mode of change that takes place within a network of two or more stakeholders. By constructive mode of change I intend the conflict between the thesis and anti-thesis, which eventually resolves in a synthesis. The resolution of the conflict, i.e., the synthesis, generates a break with the past basic assumptions that regulate their relationships. In the paper, I therefore propose a process model of innovation in services, which is centred on the dialectic motor of change, and driven by stakeholder dialectics, as illustrated in Figure 12. In the figure, thesis and anti-thesis are associated respectively to (1) new needs and expectations of one (or more) sets of stakeholders, originated by the introduction of a change into the system; and (2) existing needs and expectations of the other stakeholders. The conflict is the mismatch of needs and expectations resulting from the confrontation of diverse stakeholders, which eventually resolves in a synthesis.

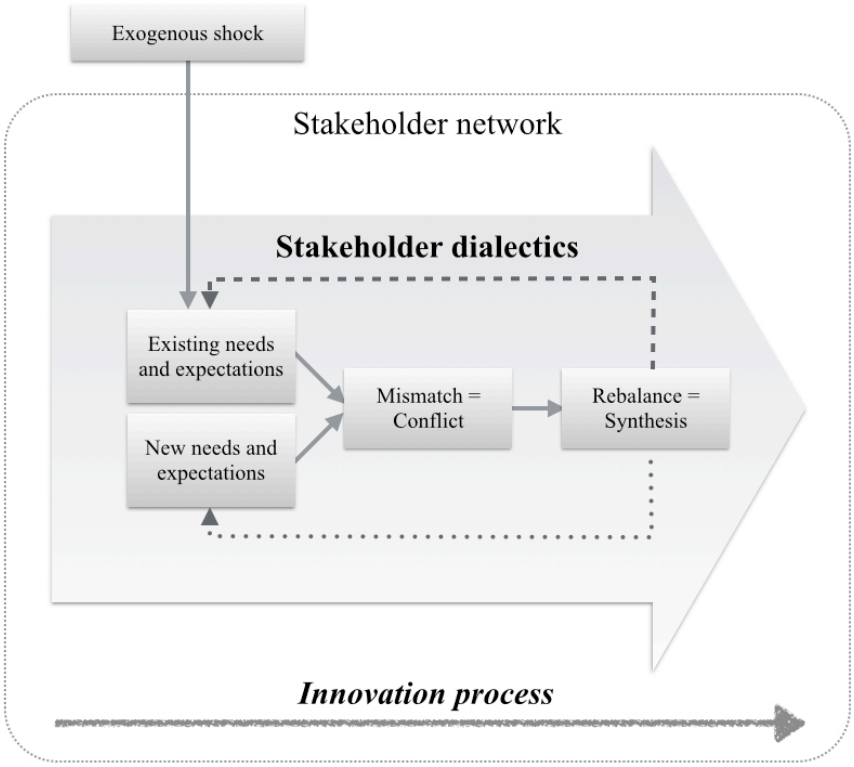

Figure 12: Dialectic process model of innovation in services.

In short, when change is introduced into the system, stakeholder dialectics kick in, as new needs and expectations (of one or more sets of stakeholders) are confronted with existing ones. The resulting mismatch of needs and expectations turns into an explicit or implicit conflict, which is resolved by re-balancing the interests of the different parties into the synthesis. Finally, the synthesis feeds back into the process, as (1) new status quo for some stakeholders (dashed line in the figure) and as (2) endogenous change for others (dotted line in the figure). In the model, stakeholder dialectics are represented as a big arrow, as they are intended as a transition, and not a status. The succession and combination of various episodes of stakeholder dialectics is what constitutes the innovation process, and contribute to eventually reaching innovation outcomes. In other words, the proposed model of innovation in services stresses the mismatch of needs and expectation of different stakeholders as one of the driving forces of innovation in services. In addition, it sees the succession and combination of various episodes of stakeholder dialectics as one of the constituting elements of the innovation process, which contributes to eventually reaching innovation outcomes.

Paper 3: The interactions between innovation in services and ICT: A conceptual typology

The purpose of paper 3 is to outline how scholars have conceptualised and defined the relationship between innovation in services and ICT so far, to strengthen the research area as field of study and support its progress. To categorise existing research on the investigated issue, I identified two main concepts through a preliminary literature search: (1) type of ICT involvement, i.e., in the innovation outcome (ICT as product) or in the innovation process (ICT as special capital input); (2) type of innovation, i.e., technological innovation, organisational innovation, business model innovation and innovation in the service offering. In addition, I classified the involvement of ICT as special capital input as: (1) enabler, when innovation in services derives from the introduction of a new technology or from the different use of an existing one, i.e. banking and e-government services; (2) support infrastructure, when the technology lowers the effort required for implementing an innovation, i.e. online help desk for the employees during a change process—whether of a service, a process or the whole business model; (3) utility, when ICT adoption and use aim at reducing costs while increasing coordination of inter- and intra-organisational activities. In the latter case, the development and implementation of ICT facilitates and improves business processes intended to produce innovation, as in the case of webinars.

Through a concept-centric literature review I then identified five umbrella themes, in which relevant research could be classified: (1) management of ICT-based technological innovations in services; (2) management of organisational innovation in ICT-based services; (3) business model innovation in services; (4) new service development and innovation in the service delivery; (5) relationship between innovation in services and ICT. The issues touched upon within the themes overlap to a certain extent. While this overlap could be considered as a weakness of the proposed analysis, it allows both organising existing literature and delineating three main process aspects of the relationship between ICT and innovation in services: (1) the integration of organisational and innovation process; (2) the cooperation among internal and external agents; (3) the self- reinforcing mechanism that characterises ICT as a product. The first two aspects make it necessary for service organisations to invest additional innovation effort and complementary capital inputs to obtain a positive outcome from the interaction of ICT with innovation in services so as to benefit from its impact as special capital input. The third, on the other hand, shows that technology innovation has the direct and immediate positive effect to stimulate the development of other types of innovation when involved as a product, i.e., when dealing with ICT-based technological innovations. The five umbrella themes, in turn, enabled capturing different perspectives on the relationship between innovation in services and ICT into a conceptual typology, which is visualised in Figure 13.

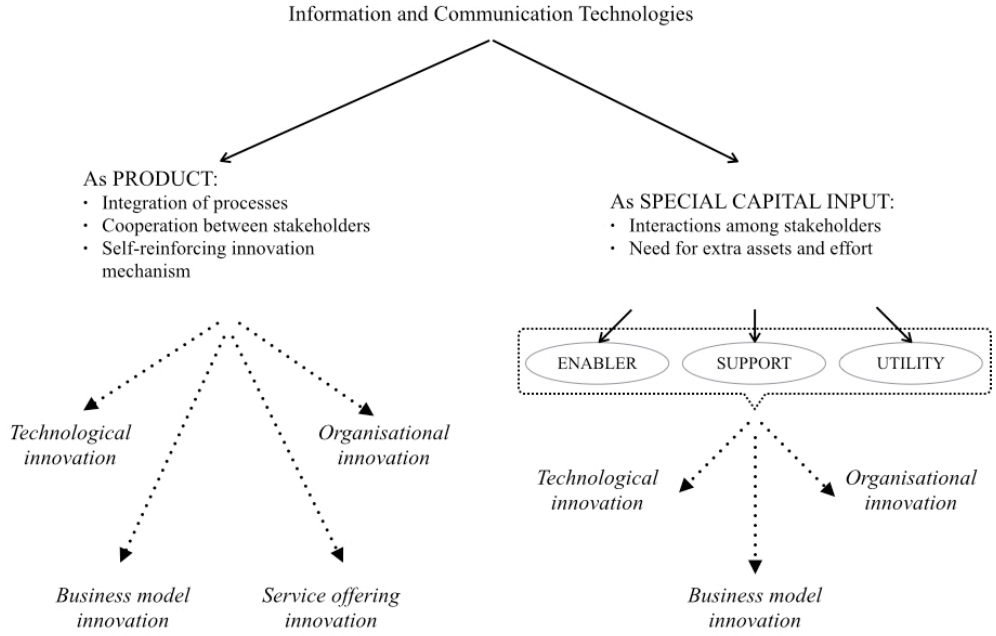

Figure 13: Conceptual typology - The relationships between innovation in services and ICT.

The self-reinforcing mechanism emerges as a crucial facet of the relationship between innovation in services and ICT. Such mechanism is in fact implicitly described in many of the studies that resulted from the literature search, although not yet explicitly investigated. In short, when ICT is implemented as enabler for service innovation, it carries a self-reinforcing innovation mechanism that creates virtuous cycles for service and technology innovation, which stimulates further service and technology innovation. The impact of innovation on ICT is therefore linked to (a) the stimulation of diffusion, substitution and competition mechanism that are involved in market dynamics and (b) the creation of inputs that feed further innovation of the ICT themselves, in form of technology or service innovation. On the contrary, dedicated effort needs to be invested into those aspects of the organisational innovation that have an impact on the use of the technology, such as the division of labour and knowledge (Williams et al., 2011) and the links between decisional centres (Gambarotto & Cammozzo, 2010). The same applies to business model innovation, which requires long-term dedication and effort to achieve successful innovative results (Drozdová, 2008; Hempell, 2005).

The analysis of existing literature also allowed to point out a few theoretical gaps: (1) business model innovation related to ICT in the service context; and (2) open innovation and ICT in practice. In the first case, further analysis is needed to better understand how ICT can better sustain business model innovation within services. Similarly, scholars should investigate further

on the role of ICT within open innovation in services, as existing knowledge on the topic is starting up through the study of stakeholder interactions and cooperation, but still lacks validation and specificity.

Paper 4: Involving users in complex service systems' innovation processes by means of ICT-based tools: The case of Facility Management Services

Paper 4 is meant to continue on the path towards a clearer understanding of the relationship between innovation in services and ICT, as well as to extend the firm-centric perspective of research on user involvement during innovation in services by emphasising the involvement of heterogeneous stakeholders and related support tools. The specific aim of the study is to investigate how demand stakeholders, i.e., clients, customers and end users, could be involved by means of ICT-based tools throughout processes of innovation in the context of FM services. As mentioned above, the paper goes beyond the typical firm-centric perspective that characterises existing literature on innovation in services, as, although it takes the perspective of the providers, it emphasises the different roles that stakeholders plays in the innovation process of FM service offerings and related delivery.

The results from the study indicate that, in FM services, different demand stakeholders (clients, customers, end users) may be involved in different ways in the innovation process of FM services (as users, resource, co-creators). More specifically, not only the involvement of demand stakeholders is variable depending on the offered services, but also on the specific role that FM demand stakeholders play with regards to the service being innovated. This means that, throughout each innovation process, client, customers and end users are typically involved in a variety of ways and through diverse tools that match their specific set of needs and expectations. Stages of the new service development, for instance, during which strategic decision-making takes place are those in which the most direct involvement is required. In fact, the client, represented by the top management of the organisation where the innovation will be launched, and the customer, i.e., the internal FM unit, need to approve every investment and effort related to the innovation process and its outcome before the providers can implement it. End users, on the other hand, are not considered as feasible for involvement in strategic stages. In fact the heterogeneous and individual needs of end users are believed to (1) not correspond to those of the organisation as a whole and (2) be often too operational. On the contrary, end users are well fitted for involvement in operational stages, as they know the daily provision of services and are both interested in, and able to, point out how to improve it.

At the same time, demand stakeholders can be involved to a variable degree in innovation processes in services, as (1) users; (2) resource; or (3) co-creators (Nambisan, 2002). When involved as users, demand stakeholders test the innovated service and provide feedback based on

their experiences, which allows the service innovators to improve their offering upon reproduction. Secondly, the involvement as resource is usually passive, as the provider needs to find out about stakeholders' opinions, needs and expectations and thus distributes surveys or organises focus groups. Finally, when involved as co-creators demand stakeholders participate actively in some of the activities of the innovation process, such as the design of the innovation outcome.

Depending on which parties, and to which degree the service innovators want to involve demand stakeholders in the innovation process, certain tools for stakeholder involvement might be more effective than others. In Table 12 we synthesised the support tools that are and might be used to facilitate stakeholder involvement in innovation processes of FM service offerings and related delivery. The tools are classified in relation to two dimensions: (1) type of stakeholder (client, customer, end user) and (2) degree of involvement (user, resource, co-creator).

Table 12: Tools for stakeholder involvement in innovation processes in services.

	User	**Resource**	**Co-creator**
Organisation as a whole/Client	• *Ad hoc* meetings	• Transparency matrices and models • Workshops • Scenario analysis (with or without simulation IT)	• Regular and *ad hoc* meetings • Workshops
Internal FM unit/Customer	• Workshops	• Workshops • Shared training • Team buildings activities • IT for information management and sharing	• Workshops • Face-to-face meetings • ICT for information management and sharing • Team building activities • Scenario analysis (with or without simulation IT)
Employees/End-users	• User-surveys • User workgroups • Workshops	• User-surveys • Face-to-face interviews • Workshops • Idea competitions • Shared training • Team-building activities	• Shared training

Paper 5: Facilities management innovation in public-private collaborations: Danish ESCO projects

Paper 5 focuses on how internal providers of FM services, i.e. FM units, of local governments navigate and manage the collaboration of different, intra- and inter-organisational actors when innovating through public-private collaborations such as ESCO projects. The objective of the study is to investigate the involvement of heterogeneous stakeholders throughout innovation processes in the context of public-private collaborations for the provision of FM services. Specifically, this objective is reached by combining literature on innovation processes in services with specialised research on the management of innovation in FM services, and theories on collaborative innovation in the public sector.

In the paper, we argue that ESCO collaborations can be characterised as FM innovation processes in the public sector, because they result in outcomes, such as new processes for energy monitoring and new practices of cooperation between intra- and inter-organisational actors, which reflect the definition of innovation that we adopt in the paper. Such outcomes (listed in the paper in Table 1 under *Improvements*) are in fact ideas, often generated by the ESCO provider, which are developed and put into practice and which provide various benefits to the different parties who contribute to their development. The ESCO provider gains financial remuneration based on its success in reducing energy consumption within the pre-determined time frame, while the public institution achieves positive political attention from the guaranty of energy savings and from the visibility of savings from Day 1. Furthermore, the internal FM unit benefits from the outcome of ESCO collaboration, because it can operate with much more capacity and speed in reducing energy consumption, it can be trained and thus learn how to manage energy reductions once the contract has expired and it can focus on operations and output instead of verification and monitoring. Finally, the desired outcomes of ESCO collaborations are specified in each contract but the internal FM unit and/or local governments can reproduce them in new contracts with external parties.

In summary, the FM unit seems to be typically the driver of ESCO contracting arrangements, as well as the managing actor of interactions between stakeholders. The findings, more precisely, suggest that public entities' FM units play multiple roles in relation to their different stakeholders, whom they address while innovating during public-private partnerships. We therefore propose a model (Figure 14), which describes the three roles that public entities' FM units play during innovation processes that are carried out through public-private partnerships, such as ESCO collaborations.

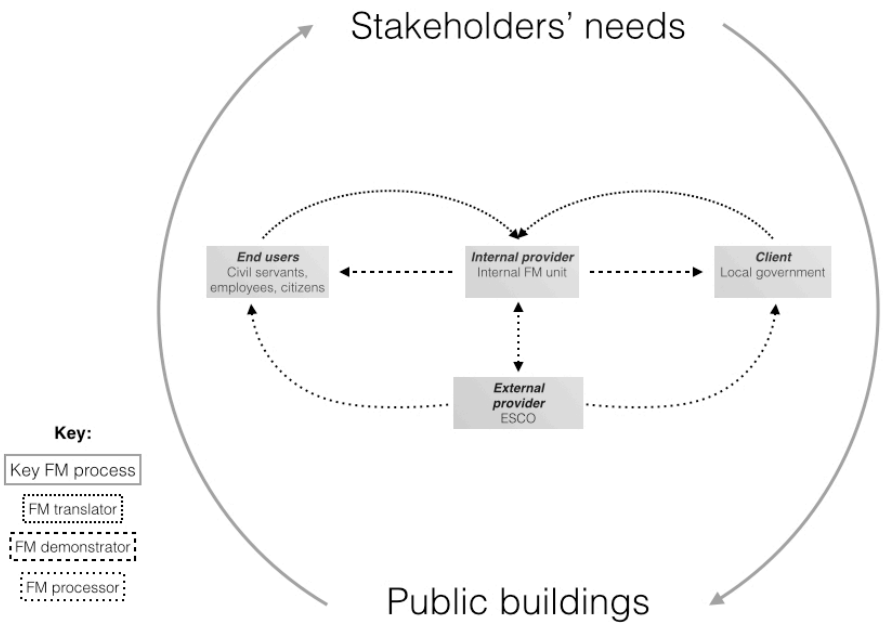

Figure 14: The three roles of FM units during public-private collaborative innovation processes.

We argue that during ESCO collaborations and public-private partnerships in general, stakeholder needs are taken into consideration to guide innovation processes, e.g., energy renovation for managing public buildings, whose outcomes in turn, aim to satisfy stakeholder expectations. In other words, the FM unit (1) coordinates between clients and end users by acting as translator and demonstrator and (2) collaborates with the ESCO company to implement energy renovation (FM processor). Conversely, both the FM unit and the ESCO provider play the role of FM processor during the innovation process. The FM unit acts as the processor in setting the stage. Moreover, the FM unit makes sure that the ESCO company manages the FM innovation outcomes, therefore (1) serving the client, (2) negotiating with the customer (i.e., that same FM unit), and (3) providing the innovated services to the end users. Finally, the FM unit acts as the demonstrator to document the outcome(s) of the innovation to clients and end users (including the community and society).

Theoretical contributions and discussion

This dissertation sets out to contribute to theories on innovation processes within the service context. Overall, the main theoretical contributions of this work are two-fold, and lay in the proposal of the two novel constructs: (1) *stakeholder dialectics* and (2) *dynamic and interactive consistency*. On one hand, stakeholder dialectics embeds the argument that tensions and conflicts unfold along with innovation processes, as every step of such processes constitutes an

unsettlement in the status quo, which, in turn, might generate a mismatch of needs and expectations of the stakeholders (Nardelli, 2014a). The process model based on stakeholder dialectics, which is proposed in paper 2, does not aim at substituting previous models of innovation processes in services. Rather, it contributes to a clearer understanding of innovation processes in services, as it describes the involvement of a motor of change, the dialectic one, whose action has been recognised, yet not extensively researched. Early literature on innovation in services, in fact, identified the potential tensions that might arise among the stakeholders of innovation processes (Sundbo, 1997). Later on, however, scholars focused on life-cycle (e.g., Alam & Perry, 2002; de Brentani, 1991; Scheuing & Johnson, 1989) and teleological (e.g., Edvardsson et al., 1995; Gallouj & Weinstein, 1997; Martin & Horne, 1993; Sundbo, 1997) motors of innovation, and presented stakeholder interactions within processes of innovation in services as a cooperative and controllable issue. Similarly, the few works on the dialectic motor of innovation (Chae, 2012; Edvardsson & Olsson, 1996; Flikkema, Jansen, & Van Der Sluis, 2007) failed to consider the emergence of tensions and conflict between heterogeneous stakeholders.

Stakeholder dialectics and the related process model of innovation in services explain what happens throughout the trial-and-error, overlapping processes that are at the centre of the practice-driven model of innovation (Edvardsson et al., 1995; Sundbo, 1997). Stakeholder dialectics and the related process model thus contribute to the theory on innovation processes in services. Previous research has stressed that *services happen* (Martin & Horne, 1993) and that customer involvement might increase the rate of success of innovation when dedicated methods and tools are used to cooperate and co- develop with customers and other stakeholders (Ettlie & Rosenthal, 2011; Kuusisto & Riepula, 2011). Based on the findings obtained for this study, I argue that not only collaborative processes, but also emerging tensions and conflicts between heterogeneous stakeholders drive innovation processes in services. This confirms the interactive, local, multi-dimensional, unpredictable and emergent nature of innovation processes in services as argued by Chae (2012). At the same time, the identification of stakeholder dialectics as one of the driving mechanisms of innovation in services supports the position of Flikkema et al. (2007) and of Edvardsson and Olsson (1996), who argue for the co-existence of prescribed and unplanned processes within innovation in services, when multiple units of change are taken into consideration.

On the other hand, dynamic and interactive consistency is grounded in business model innovation theories, which were chosen as basis for an analytical framework to tackle processes of innovation within service organisations over time. Dynamic and interactive consistency refers to the argument that an organisation trajectory, i.e., the way an organisation creates, delivers and captures value over time, is the result of the intertwining between (1) emerging trends and events, which are related to the organisational trajectories of stakeholders and (2) the deliberate decision

of the organisation itself. Dynamic and interactive consistency thus brings the construct of dynamic consistency (Demil & Lecocq, 2010) into the service context, and extends it beyond the interdependency between elements of the business model (Achtenhagen et al., 2013; Amit & Zott, 2012; Demil & Lecocq, 2010; Mäkinen & Seppänen, 2007; Morris et al., 2005; Zott & Amit, 2010), to the interactions between stakeholders (Nardelli, 2014a). Furthermore, the construct of dynamic and interactive consistency complements the existing argument that the business models of related organisations interact with each other (Sanchez & Ricart, 2010; Storbacka et al., 2013; Tikkanen, Lamberg, Parvinen, & Kallunki, 2005), by showing how the way related organisations create, deliver and capture value over time, i.e., processes of business model innovation of an organisation and its stakeholders, are in fact intertwined and co-evolutionary. Therefore, the construct of dynamic and interactive consistency contributes to the theory on business model innovation in services.

In addition, this dissertation entails minor contributions to specific areas of theory on innovation in services. First, it contributes to the theory on user involvement in innovation processes in services by pointing out the heterogeneity of those stakeholders that existing literature generally calls *users* or *customers* (demand stakeholders in this dissertation), and of their needs and expectations (Nardelli et al., 2015; Nardelli & Scupola, 2013). Given their diverse needs and expectations, the involvement of demand stakeholders does not only follow the frameworks that were outlined in previous theory (e.g., Abramovici & Bancel-Charensol, 2004; Alam, 2002, 2011, 2013; Bitner et al., 2008; Busse & Wallenburg, 2011; Johne & Storey, 1998; Kuusisto & Riepula, 2011; Melton & Hartline, 2010; Mota Pedrosa, 2012). On the contrary, the involvement of demand stakeholders depends on the specific role they play with regards to the service being innovated (clients, customers, end users) and the type of involvement that is aimed for (user, resource, co-creator) (Nardelli & Scupola, 2013).

Second, it offers a "partial" contribution to the theory on innovation by highlighting the role of the self-reinforcing mechanisms within the relationship between innovation in services and ICT. Whereas such mechanism has been implicitly described in existing theories, it has not been explicitly investigated yet. Through the systematic literature review, nonetheless, it was possible to get an overview of those characteristics of the self-reinforcing mechanisms that emerged from previous studies. When ICT is implemented as enabler for service innovation, in fact, it carries the self-reinforcing innovation mechanism, which creates virtuous cycles for service and technology innovation, which stimulates further service and technology innovation carrying the same mechanism. The impact of innovation on ICT is linked to (a) the stimulation of diffusion, substitution and competition mechanism that are involved in market dynamics and (b) the creation of inputs that feed further innovation of the ICT themselves, in form of technology or service innovation (Ayres & Williams, 2004; Bygstad & Aanby, 2010; Bygstad, 2010; C. Chen,

Watanabe, & Griffy-Brown, 2007; Chen & Watanabe, 2006; Lee, Kim, & Park, 2009; Lee, Trimi, Byun, & Kang, 2011). Dedicated effort needs to be invested into those aspects of the organisational and business model innovation that have an impact on the use of the technology (Drozdová, 2008; Gambarotto & Cammozzo, 2010; Hempell, 2005; Williams et al., 2011). While this research finding is likely not sufficient for a theoretical contribution in itself, it gives a hint to how theory on the relationship between ICT and innovation in services can be further developed, i.e., by explicitly tackling the self-reinforcing mechanism.

Finally, this work also contributes to the specialised theories on innovation in the FM service context, as it depicts the intermediary role that internal FM units play when navigating and managing innovation processes within public-private collaboration (Nardelli et al., 2015). The literature on innovation within the FM service context is still developing, and paper 5 is the first to specifically emphasise the public sector, thereby contributing to a wider understanding of innovation within the FM industry (Mudrak et al., 2005). This study confirms and extends the results of Noor and Pitt (2009) and Tay and Ooi (2001) to the public sector, who have spotted the potential of the FM unit for the innovation agenda of the organisation that it serves. In other words, by mediating and managing relationships among public and private stakeholders, FM units have the ability to actively contribute to the innovation strategies of the public entities that they serve—in addition to simply supporting end users' daily routines—in a manner similar to their private equivalents.

To conclude, it is worthwhile to briefly evaluate the theoretical contributions that were just outlined. Whetten (1989) stresses that a complete theory must contain four essential elements:

1. *What*, i.e., the factors that should be considered as part of the explanation of the phenomena of interest, to be evaluated on the basis of comprehensiveness and parsimony;
2. *How*, i.e., the way the factors in the theory are related to each other;
3. *Why*, i.e., the underlying dynamics that justify the selection of factors and the proposed causal relationship;
4. *Who*, where and when, i.e., the conditions that place limitations on the proposition generated from a theoretical model.

Whetten (1989), in addition, points out that most organisational scholars are not going to generate a new theory from scratch, while they are most likely to improve previous theories. Therefore, it might be difficult to evaluate which outcomes constitute a valuable contribution to the theory, which is why it is important to explicitly compare "new" theory with the existing ones. The discussion between similar and contrasting findings furthermore enhances internal validity and generalizability, and adds to the conceptual level. In fact, it ties together underlying similarities in phenomena that are normally not associated with each other (Eisenhardt, 1989a). In Table 13, I

summarise the theoretical contributions of the five papers that are included in this dissertation, and organise them based on Whetten's (1989) evaluation criteria. In addition, the table outlines which background the papers build on and how they contribute to existing theories.

Table 13: Summary of theoretical contributions.

	Theoretical background	Theoretical contribution	What?	How?	Why?	Who, where, when?
Value co-creation and business model innovation in services.	Value co-creation; business model innovation.	Dynamic and interactive consistency (business model innovation theory in the service context).	Business model of an organisation; business model of its stakeholders; time.	Business model innovation processes of service organisations are inter-twined and inter-dependent.	Service organisations and their stakeholders, when aiming at value co-creation, influence each other's development over time.	FM service context, Denmark and Southern Sweden (Skåne), period following professionalization of FM services.
Stakeholder dialectics and innovation in services: A process perspective.	Innovation processes in services; motors of innovation.	Stakeholder dialectics (process theory of innovation in services).	Needs and expectations of stakeholders; endogenous and exogenous change; balance.	Mismatch of needs and expectations of diverse stakeholders (thesis and anti-thesis) triggers a conflict, which resolve in a synthesis that represents a change in itself.	Strive for synthesis when change is introduced into a system drives innovation, as synthesis is a change in itself for at least one set of stakeholders.	FM service context, Denmark and Southern Sweden (Skåne).
The interactions between innovation in services and ICT: A conceptual typology.	Innovation in services; management of ICT.	Self-reinforcing mechanism of innovation in services and ICT (theory on relationship between innovation in services and ICT).	Involvement of ICT in innovation processes in services; impact of innovation on ICT development.	It is not only ICT that supports innovation in services, but innovation in services actually also stimulates the development of ICT.	The impact of innovation on ICT is linked to stimulation of market dynamics and creation of inputs that feed further innovation of ICT.	ICT, service, innovation; ABI Inform, Scopus and ISI Web of Knowledge
Involving users in complex service systems' innovation processes by means of ICT-based tools: The case of Facility Management Services.	User involvement in new service development.	Heterogeneity of demand stakeholders (theory on user involvement in new service development).	Role of demand stakeholders with respect to the innovation (clients, customers, end users); type of involvement (user, resource, co-creator).	Involvement of demand stakeholders is variable depending on offered services and on specific role that they play with regards to the service being innovated.	Heterogeneity of needs and expectations of demand stakeholders makes their fit to contribute to certain phases of the new service development variable.	FM service context, Denmark and Southern Sweden (Skåne).
Facilities management innovation in public-private collaborations: Danish ESCO projects.	Collaborative innovation in the public sector; management of FM services.	FM unit as translator, demonstrator, processes in public-private collaborative innovation (specialised theory on innovation processes within FM services).	Role of demand stakeholders with respect to the innovation (clients, customers, end users); needs and expectations of stakeholders.	The relationships between stakeholders influence the way the FM unit navigates and manages the innovation process.	Multiple needs and expectations as well as varied power structure characterises the role of FM unit as active or passive at different points in the innovation process.	Public-private collaborations, FM service context, Denmark.

Implications for practice

Relevance to practice contributes to the quality of theoretical contribution, along with generalizability and validity (Weick et al., 1995; Whetten, 1989). According to Corley and Gioia (2011), when building theory on issues related to organisational management, including innovation, a researcher should pay attention to have not only practical relevance, but also some degree of foresight in identifying important coming issues and problems that need to be conceptualised. The research that was conducted for this dissertation is relevant to practice in that it tackles an issue, innovation within the service context, which is of increasing importance for the economies of developed countries (OECD, 2013). More specifically, the theoretical contributions that are proposed here entail a set of implications for practice that might support service innovators in their strive for organisational survival and growth.

Overall, this dissertation stresses the importance, for service organisations, of being aware of stakeholder interactions throughout innovation processes. In other words, customer involvement is not sufficient, and should be completed by stakeholder management for a purposeful navigation of the interactions between parties, and consequently more aware management of innovation process.

First, the identification of tensions and conflicts between heterogeneous stakeholders as driver of innovation processes in services implies that a stronger attention to stakeholder interactions should include proactive expectation management and a constant mapping of parties that are currently or should potentially be involved in innovation processes. In fact, mapping the needs and expectations of current and potential stakeholders might support the identification of potential imbalances, which in turn might prevent—and/or support the smoother management of—tensions and conflicts.

Second, outlining that the business model innovation process of an organisation is the result of the intertwining between emerging trends and events, which are related to the business model innovation of its stakeholders, might support those organisations that aim for value co-creation. The conceptual framework that describes the functioning of dynamic and interactive consistency is meant to be used also a tool to map, understand and strategically plan value co-creation throughout processes of open business model innovation. By filling in the boxes of the framework with the current business model elements of the focal organisation and its stakeholders, it makes it possible to reflect upon each aspect of the value co-creation. The time dimension, moreover, allows including future scenarios and preparing appropriate reactions.

Third, this dissertation recalls the potential that ICT-based tools might have in supporting the management of innovation processes, also because they facilitate communication, and thus interactions, between stakeholders. The matrix in Table 12 proposes a methodological tool that

service innovators might use to select the most appropriate methods to interact with their demand stakeholders and involve them in innovation processes. To choose the best methods it is crucial to establish which role each set of stakeholders plays with regards to the services that are involved in the innovation processes, as well as the type of involvement that is being aimed for.

Finally, in the specific context of public-private collaborations, not only should internal FM units of public institutions clarify what different stakeholders expect from the collaboration, but they should also (1) translate stakeholders' expectations into concrete goals and objectives; (2) process them together with the external private partners; and (3) demonstrate their execution to all stakeholders throughout the process, and not just during the closing phases of the project.

Limitations and agenda for future research

While this dissertation is certainly not free of limitations, it offers a valuable basis to outline an agenda for future research on stakeholder interactions within innovation processes in services. First of all, this work mainly builds on the qualitative investigation of a relatively small set of organisations, which operate in the context of FM services. Although such a qualitative methodology is appropriate to investigate the issues of interest in depth, it constrains the generalizability of results (Miles & Huberman, 1994; Yin, 2009). This affects specifically the results from the explorative study, which were collected based on convenience and snowball sampling. In fact, it implies that the selected sample cannot be considered as representative. To reduce the risk of biases, nonetheless, the explorative interviews were complemented with passive observation of practitioners' gatherings and archive data, and the results were discussed with both researchers and practitioners. Thanks to these procedures, the following steps of the empirical investigation entail a higher degree of confidence in the generalizability of data. This allows arguing for the applicability of results to at least other task-interactive services, because findings were extracted through theoretical sampling and systematic iteration between theory and data (Dubois & Gadde, 2002; Eisenhardt, 1989a). Yet, future research should address stakeholder interactions, and, specifically, the role of stakeholder dialectics and of dynamic and interactive consistency beyond the context of FM services, as current results already suggest a broader relevance than the one demonstrated so far. Especially for paper 4, which is mostly based on data from the explorative study, a broader sample in Denmark and abroad would be beneficial to extend the generalizability of results and strengthen further investigations of stakeholder involvement in innovation processes within the service context.

Secondly, the validity of results might be constrained by the fact that three of the papers in this dissertation are grounded in empirical material that overlaps to a certain degree, as mentioned in the methodology section of this synopsis. Such an approach is risky as it might entail biases in the collected data. Nonetheless, the three papers are built on a different research

approach, respectively inductive, abductive and deductive, which is what allowed using some of the same data without compromising the validity of results. Also, I complemented the overlapping material with additional, dedicated data and carried out separate analyses for each of the studies.

Thirdly, *innovation* is certainly a buzz-term, whose interpretation might vary from researcher to researcher, and from practitioner to practitioner. To ensure coherence, I have determined the definition of innovation for the purpose of this study at the very beginning of my investigation, and kept it stable across the various episodes of re-direction. On the other hand, to reduce the risk of biases, I asked general questions and asked respondents about their interpretation of the term. Nonetheless, a certain degree of bias is unavoidable. Therefore reflectivity was a crucial step towards ensuring the validity of empirical work, and yet, the limitation given by the popularity of innovation is worth remembering when evaluating the empirical results.

Furthermore, while this dissertation touches upon a few aspects of stakeholder interactions during innovation processes within the service context, it has focused on the unfolding of processes over time and not on relationships of cause-effect between specific variables. It therefore lacks clarity on the variance aspect, such as for instance, the outline of specific elements of stakeholder interactions that might contribute to various aspects of innovation processes and outcome. Future research could address such issue, and complement the process approach adopted here to enhance our understanding of the impact of stakeholder interactions on innovation process in services.

Finally, this study outlined some aspects of innovation in services, which are not yet extensively tackled by literature and theory. The perspective of the service-dominant logic, for example, has emerged as a valuable approach to investigate interactions between stakeholders during innovation processes. In fact, the definition of value that is proposed within the service-dominant logic, by stressing subjectivity, incorporates the role of stakeholders in the reception of innovation. Therefore, the conceptual frameworks, which the service-dominant logic entails, match an understanding of innovation as an interactive process well and might be used to observe how parties relate to each other when aiming at co-creating and distributing value. Nonetheless, the service-dominant logic has so far been developed mainly on the conceptual level, and the few empirical studies that refer to innovation (Nenonen & Storbacka, 2010; Storbacka et al., 2013) are targeted to marketing researchers and practitioners.

Future research could extend the scope of the service-dominant logic to innovation theories, and connect it to other relevant perspectives, such as, for instance, open innovation. While open innovation research is increasingly developing, it seems to be still rather grounded in the manufacturing sector (Aas & Pedersen, 2012). In the light of the synthesis approach, putting

dedicated effort into the investigation of open innovation within the context of services might not only allow depicting distinguishing features and approaches, but also reveal practices that might support manufacturers as well as service organisations in the management of stakeholder interactions throughout innovation processes. This could be of even higher relevance given the increasingly popular servitization of manufactured goods, which implies focusing innovation processes on the developing of services to be combined with tangible offerings (e.g., Baines, Lightfoot, Benedettini, & Kay, 2009; Chesbrough, 2011; Vandermerwe & Rada, 1988; Visnjic & Looy, 2013).

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PART II

ORIGINAL RESEARCH PAPERS

Paper 1: Nardelli, G. (2014b). Value co-creation and business model innovation in services. *To be submitted to Long Range Planning*.

Paper 2: Nardelli, G. (2014a). Stakeholder dialectics and innovation in services: A process perspective. *Under Review at Research Policy*.

Paper 3: Nardelli, G. (2015). The interactions between innovation in services and ICT: A conceptual typology. *International Journal of Information Systems in the Service Sector*, Forthcoming, 7(3).

Paper 4: Nardelli, G.; Scupola, A. (2013). Involving users in complex service systems' innovation processes by means of ICT-based tools: The case of Facility Management Services. *SIG SVC 2013 Workshop: Delivering and Managing Services in Systems of Service Systems, ICIS 2013*, 15th December 2013, Milan, Italy.

Paper 5: Nardelli, G., Jensen, J. O., & Nielsen, S. B. (2014). Facilities management innovation in public-private collaborations: Danish ESCO projects. *Journal of Facilities Management*, Forthcoming, 13(2).

PAPER 1

Nardelli, G. (2014b). Value co-creation and business model innovation in services. To be submitted to Long Range Planning.

VALUE CO-CREATION AND BUSINESS MODEL INNOVATION IN SERVICES

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Abstract

Services are characterized by the involvement of stakeholders in the innovation process. The aim of this study is to understand how, in the context of facility services, value co-creation unfolds throughout open business model innovation processes. An explorative study was carried out in the Danish field of facility services, and complemented with three mini-case studies and archive research. The results highlight how value co-creation unfolds throughout processes of open business model innovation due to the intertwining of the business model of an organization and its stakeholders. Open business model innovation, therefore, does not only imply reacting to changes in other stakeholders' business models, but rather actively involving stakeholders in the business model innovation process.

Keywords: value co-creation; business model innovation; open innovation; process

Introduction

Services are a major part of economic activities and employment in most economies of developed countries (OECD, 2005). Nevertheless, due to the hectic dynamics of contemporary economies, service offerings and the organizations behind them need to be continuously re-invented, and innovation has become a crucial element of survival and growth (Chesbrough, 2011). While services and tangible goods have been proven to share some common features when it comes to innovation, existing literature stresses that new product development models cannot be applied as such to innovation in the service context, which rather requires dedicated research (Bryson, Rubalcaba, & Ström, 2012; Gago & Rubalcaba, 2006). One of the distinguishing features of services as compared to tangible goods is the simultaneity of the production and consumption process, which implies co-production between the providers and the customers (Hertog, Aa, & Jong, 2010). In addition, customers are always co-creators of value: the value is not embedded in goods or services but emerges when individual goods and services are linked to other resources in the use context (Nenonen & Storbacka, 2010; Vargo & Lusch, 2004).

Therefore, to ensure survival and sustained growth in the contemporary hectic economies, service providing organizations should make sure to actively interact with stakeholders throughout their innovation process, be they aimed at developing new offerings or the organizational processes behind existing ones (Alam & Perry, 2002; Hsueh, Lin, & Li, 2010; Prahalad & Ramaswamy, 2004b; Vargo & Lusch, 2004). The active interaction with stakeholders during innovation processes, in fact, may lead to increased customer satisfaction; services with lower failure rates; better relationships with partners, suppliers and competitors; and, eventually, increased competitive advantage and service innovation performance.

According to a recent stream of research, however, active interaction with stakeholders concerns—and needs to be supported with regards to—more than the innovation of the service offerings or related organizational processes. More broadly, active interaction with stakeholders should also involve the continuous and open innovation of the business model behind such offerings and organizations (Chesbrough, 2011; Teece, 2010), where the business model is defined as the depiction of the ways the organization creates, delivers and captures value (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Doz & Kosonen, 2010). At the same time, recent service-focused literature depicts new ways of thinking about innovation in the service context, and stresses the importance of investigating, among others, business model innovation (Carlborg, Kindström, & Kowalkowski, 2014; Rubalcaba, Gallego, & Hertog, 2010; Toivonen & Tuominen, 2009). Business model innovation, nonetheless, appears to still be under researched in the service industries (Bryson et al., 2012; Nair, Paulose, Palacios, & Tafur, 2013), as well as the openness of the related processes. This suggests that, despite the recognition of the role of co-production and

value co-creation within innovation in the service industries, it is yet to be depicted how, in services, value co-creation might unfold during business model innovation.

This paper aims to fill in this gap by adopting a dynamic approach to investigate open processes of business model innovation in the context of service providing. More specifically, this study looks at business model innovation processes in facility services, a set of business-to-business support services, which was lately interested by an emergent process of professionalization (Jensen, 2010; Jensen et al., 2012) that triggered open business model innovation across facility service providing organizations. This context thus offers the opportunity to investigate open business model innovation processes in different service providing organizations, cases and situations, thereby strengthening the internal validity of the study (Yin, 2009).

To summarize, the purpose of this paper is to investigate how, within the facility service context, value may be co-created through stakeholder interaction during processes of open business model innovation. The analysis is thus centred on the following research question:

How does value co-creation unfold throughout open business model innovation processes within the context of facility services?

In short, this paper argues that, within the facility service context, relationships among and between stakeholders evolve along with the business model innovation through the development of personal relationships, trust, and better awareness of each other's business models. In other words, the business model innovation processes of an organization and its stakeholders are intertwined, and influence each other's development through value co-creation. Open business model innovation, therefore, does not only imply reacting to changes in other stakeholders' business models, but rather actively involving stakeholders in the business model innovation process.

This paper is structured as follows. Firstly, the research area; the motivations behind the investigation; and the research question were presented in the introduction. Secondly, the theoretical background depicts the existing literature on the topic of analysis, while a section dedicated to the empirical context poses the grounds for the empirical analysis of the data. In the methodology section, the research methods and the procedures that followed throughout the research process are described. The findings are then introduced and the results discussed. Finally, the conclusions explicitly answer the research question and delineate the limitations of this study and an agenda for future research.

Theoretical background

Business model innovation

The business model of an organization depicts the ways the organization creates, delivers and captures value (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Doz & Kosonen, 2010). In other words, business models touch upon various, cross-sectional aspects of an organization, as well as reflect its positioning within the market and modes of interaction with external stakeholders (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Sanchez & Ricart, 2010). On the one hand, the business model can be described as a snapshot of the current articulation of the organization's activities designed to produce a value proposition to its customers, at a given time (Osterwalder, 2004). On the other hand, recent studies stress the dynamic nature of the business model, driven by endogenous and exogenous changes, and investigate the processes behind the evolution and innovation of the business model (e.g., Achtenhagen, Melin, & Naldi, 2013; Demil & Lecocq, 2010; Doz & Kosonen, 2010), also specifically in the service context (Nair et al., 2013). Following the latter approach, this paper takes a dynamic stand and focuses on processes of business model innovation, whose related studies are reviewed here.

First of all, existing literature reveals how an organization may achieve sustained value creation through the successful shaping, adaptation and renewal of its underlying business model on a continuous basis (Hedman & Kalling, 2003; Osterwalder & Pigneur, 2010). In fact, business models cannot be static at all (Achtenhagen et al., 2013; Casadesus-Masanell & Ricart, 2011; Demil & Lecocq, 2010), but are rather in a state of continuous evolution, i.e., a fine-tuning process that involves both voluntary and emergent changes. Such business model evolution calls for dynamic consistency, which is defined as the capability to build and sustain performance by anticipating and reacting to change while innovating the business model (Demil & Lecocq, 2010). Organizations must therefore drive business model innovation dynamically through experimentation and trial-and-error learning (McGrath, 2010; Moingeon & Lehmann-Ortega, 2010; Sanchez & Ricart, 2010; Sosna, Trevinyo-Rodríguez, & Velamuri, 2010), and with the support of strategic sensitivity, leadership units and resource fluidity (Chesbrough, 2010; Doz & Kosonen, 2010). Combining this approach with Amit and Zott (2012) definition, business model innovation is in this paper defined as the creation of (a) a new market or (b) new opportunities in existing markets and exploitation thereof in observation of, and response to, endogenous and exogenous changes.

Secondly, previous studies propose various models of business model innovation processes: from linear business model life cycles (e.g., Amit & Zott, 2012; Morris, Schindehutte, & Allen, 2005; Morris, Schindehutte, Richardson, & Allen, 2006; Osterwalder & Pigneur, 2010; Osterwalder, 2004; Willemstein, van der Valk, & Meeus, 2007) to emergent and co-evolutionary

process models (e.g., Achtenhagen et al., 2013; Cavalcante, Kesting, & Ulhøi, 2011; Demil & Lecocq, 2010; Francis & Bessant, 2005; Sosna et al., 2010; Svejenova, Planellas, & Vives, 2010; Tikkanen, Lamberg, Parvinen, & Kallunki, 2005). One common feature of these models, which relates to the very nature of the business model construct, is the need for consistency between and among activities, transactions and relationships that are linked to the different components. For instance, Morris, Schinderhutte and Allen (2005) stressed the need for maintaining a fit in the configuration of internal and external elements and actions. More recently, Achtenhagen et al. (2013) proposed three critical capabilities for managing sustained value creation: (1) orientation towards experimentation and exploitation of new and old business opportunities; (2) balanced use of resources; (3) coherence between active and clear leadership, strong organizational culture and employee commitment, which mutually reinforce each other as complementary towards value creation.

Finally, another stream of work on business model innovation relates to the external orientation of the business model construct and investigates the role of the external environment as well as of stakeholders. Such stream originated from the argument that, given that the business model integrates firm-internal and market-related aspects, the evolution and innovation of the business model over time is influenced by the observation of and reaction to both internal and external changes and stakeholders (Hedman & Kalling, 2003; Nenonen & Storbacka, 2010; Tikkanen et al., 2005). In other words, new business models are derived by the mutation of existing business model components as consequence of the co-evolutionary relationship between the business model of an organization and the social context in which it operates (Hedman & Kalling, 2003; Tikkanen et al., 2005). Chesbrough and Rosenbloom (2002), for instance, underline that business model innovation requires the coordinated effort of various actors within the organization to achieve positive results. By focusing on low-income markets, Sanchez and Ricart (2010) observe that an organization's ecosystem might in fact have a decisive influence on business model configuration. According to their study, interactive business models, i.e. connected with other business models, as compared to isolated ones, better support reciprocal learning and experimentation, and thus allow exploiting opportunities while at the same time being part of the opportunity itself (Sanchez & Ricart, 2010). More recently, Storbacka and colleagues have argued for value co-creation as a main outcome of business model innovation, and stressed that organizations tend to orchestrate their stakeholders to provide solution elements to selected customers, thereby influencing value creating opportunities in the network (Nenonen & Storbacka, 2010; Storbacka, Windahl, Nenonen, & Salonen, 2013).

Despite having outlined the need to look at and interact with stakeholders when driving business model innovation (Doz & Kosonen, 2010; Morris et al., 2005; Nenonen & Storbacka, 2010; Sanchez & Ricart, 2010; Storbacka et al., 2013), existing literature has not yet investigated

processes of open business model innovation, in which value is co-created by interacting stakeholders. Similarly, while the idea of a leaky boundary allowing internal and external knowledge exchanges fits with the nature of services, where the interaction of internal and external factors supports the innovation process (Alam & Perry, 2002; Jiménez-Zarco, Martínez-Ruiz, & Izquierdo-Yusta, 2011; Jong & Vermeulen, 2003; Matthing, Sandén, & Edvardsson, 2004), open business model innovation is yet to be researched in the service context, as shown in the next section of the theoretical background.

Innovation in services and value co-creation

While the debate on innovation in services is still open, scholars have recently agreed on the non-applicability of new product development models to innovation in services (Bryson et al., 2012). This is due to (1) the non-separation of process, product and organizational innovation; (2) the importance of combining technological and non-technological (or soft) innovation; as well as (3) the missing distinction between the creation of service offerings and their production and/or commercialization, which characterize innovation in services as compared to tangible goods (Bryson et al., 2012; Gago & Rubalcaba, 2006). In other words, innovation in services does not only refer to new service offerings, but also to new organizational settings, processes and technologies that allow the service provision (Bryson et al., 2012; Drejer, 2004), as well as the business model behind it (Carlborg et al., 2014). Service providing organizations, therefore, need to adapt rapidly to changing global environments, thereby innovating their business model to react to new challenges and market opportunities (Nair et al., 2013).

Adaptability and agility towards business model innovation, however, are not the only capabilities required for service providing organizations to succeed. The relationship between service provider organizations and their stakeholders influences—and might effectively enhance—the performance of innovation in services, meaning that organizations need to nurture closer relationships with their stakeholders to support innovation processes (Hsueh et al., 2010; Prahalad & Ramaswamy, 2004a, 2004b; Vargo & Lusch, 2004). A well-known stream of studies focuses on the involvement of users and customers (e.g., Alam & Perry, 2002; Alam, 2002); while the recent work on open innovation more generally defines innovation in services as the outcome of complex interactions between agents, capabilities and preferences (Bryson et al., 2012; Chesbrough, 2003, 2011; West, Salter, Vanhaverbeke, & Chesbrough, 2014). Similarly, the Service-Dominant Logic (SDL), which claims a new perspective in marketing, proposes service providing as the fundamental basis for economic exchanges (Vargo & Lusch, 2004) and suggests that all social and economic actors within and across the boundaries of the organization interact with each other and integrate resources to co-create value (Nenonen & Storbacka, 2010; Vargo & Lusch, 2004). This paper follows the SDL approach that proposes value co-creation as a phenomenon in which many actors in a network co-create value, and defines value accordingly.

Value is thus defined here as uniquely and phenomenologically determined by the beneficiary, i.e., as value in use and in context, rather than as the monetary benefit derived by the providing organization, i.e., value in exchange (Vargo & Lusch, 2004, 2007). Nenonen and Storbacka (2010), for instance, show how value creation in services does not take place exclusively within the boundaries of the organization. On the contrary, value appears to be co-created among the various stakeholders in the networked market where service providers operate (Nenonen & Storbacka, 2010), meaning that value co-creation is subject to changes in the organization's external environment (Lusch, Vargo, & Tanniru, 2009). In other words, for value co-creation to be successful, agility, adaptability and learning are crucial not only within, but also beyond the boundaries of the organization, i.e., between and among stakeholders, and in turn allow service providing organizations to survive and grow (Lusch et al., 2009).

To conclude, if it is accepted that value co-creation supplants the processes of value exchange between service providing organizations and their customers (Prahalad & Ramaswamy, 2004a, 2004b) and that business model innovation is one of the increasingly important facets of innovation in services (Carlborg et al., 2014; Chesbrough, 2011), it can be argued that an open approach towards business model innovation can lead to the co-creation of value. While existing literature unravels various aspects of innovation processes in services, the way value co-creation unfolds throughout open business model innovation within the service context has yet to be uncovered. This study aims at shedding light on this issue by emphasising the interactions between internal and external stakeholders within the context of facility services. But what are facility services, and how can selecting such context contribute to the uncovering of value co-creation throughout business model innovation processes? In the next section, these questions are answered by introducing the context of facility services and its features in relation to innovation and value co-creation.

The empirical context: facility services

Facility services involve the more or less integrated management of people, processes and places with the aim of supporting and improving the effectiveness of the primary activities of an organization (Alexander, 1992). Therefore facility services include a wide range of support tasks and activities, whose interplay is crucial to achieve value creation for the stakeholders (Jensen, 2008). Figure 1, adapted from Jensen (2008), visualizes an example of the range of facility services, organized in five categories, in the organizations that were included in this study. In short, facility services are those services, which ensure the correct functioning of the organization by supporting its employees in the daily implementation of their tasks. As shown in figure 1, examples of facility services include real estate management, workplace management and allocation, technical maintenance, cleaning, catering and so on. The key to add value when

innovating facility services is the clear understanding of the specific needs of each organization, and their developments over time (Noor & Pitt, 2009). Added value in facility services is not only economic value derived from cost cutting, as it used to be, but rather holistically refers to exploiting input and throughput to obtain the best possible output in terms of services provided to the end users (Jensen, 2010; Jensen et al., 2012).

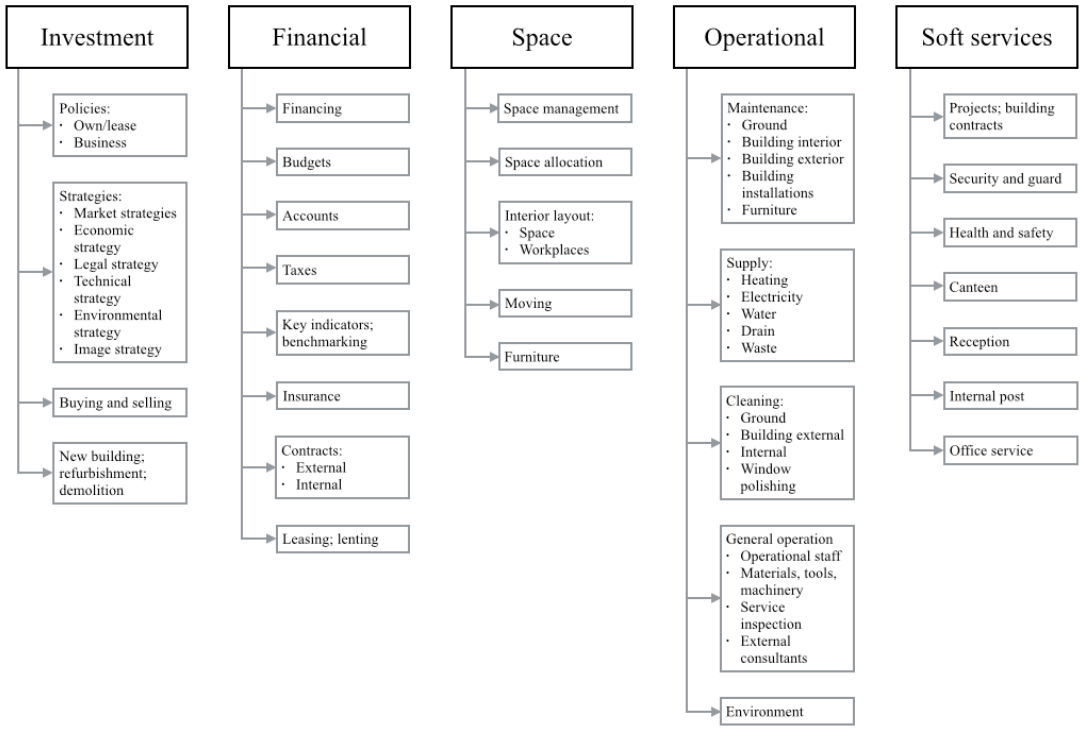

Figure 1: A classification of FM services (Adapted from Jensen, 2008).

Two main reasons justify the selection of facility services as empirical context for this study. First, the importance of open approaches and active involvement of stakeholders mentioned above has been recently recognized in facility services as well (e.g., Coenen, Alexander, & Kok, 2013; Felten, Coenen, & Pfenninger, 2012; Jensen et al., 2012), and specialized research has stressed the importance of approaching innovation in facility services with a demand-driven, service-oriented and user focused perspective (Coenen et al., 2013). Such developments in the facility service field allow connecting not only specialized facility service research and empirics with theories of innovation in services, but also with the approach towards value co-creation proposed by the SDL. In addition, the processes of business model innovation, which could be observed in the facility service context as consequence of the professionalization of the field, may be classified as open. In fact, such business model innovation processes emerged as grounded in co-creation of value through the pro-active interaction and cooperation of stakeholders—thereby classifying as relevant unit of analysis for this study (Yin, 2009). In other words, the facility service context

allows carrying out a multiple case study, in which business model innovation processes constitute the units of analysis.

Secondly, due to their nature as support business-to-business services, facility services present a peculiar value network, in which interactions between stakeholders aimed at value co-creation may be transparently observed, whatever the type of innovation process under investigation (Coenen et al., 2013). When one or more facility services are outsourced, in fact, two main parties are involved in the supply of services: the internal function responsible for the procurement of facility services and the outsourced service provider(s). Please notice that, to reflect the terminology commonly used within organizations, the function of the organization, which is responsible to procure facility services will be referred to as internal Facility Management (FM) unit. On the other hand, three key stakeholders are involved in the demand side of facility services: clients, customers and end users. The client is the organization as a whole, which specifies and orders the provision of facility services by means of FM agreements with the internal FM function. The customer is the internal FM unit, which manages the relationship with the outsourced service provider(s) through service agreements. Finally, the end users are the employees of the organization, who receive the facility services (Coenen et al., 2013). On the one hand, this implies that the stakeholders on the demand side perceive the value created by facility service in different ways. On the other hand, value co-creation takes place within the provision of facility services, thanks to the interaction of the various stakeholders on both demand and supply side (Coenen et al., 2013). If facility services are not outsourced, but rather provided internally by the FM unit, the variety of stakeholders diminishes, but value co-creation still happens among the internal stakeholders. Figure 2 displays a visual representation of the value network of facility services, which outlines the relationship between supply and demand.

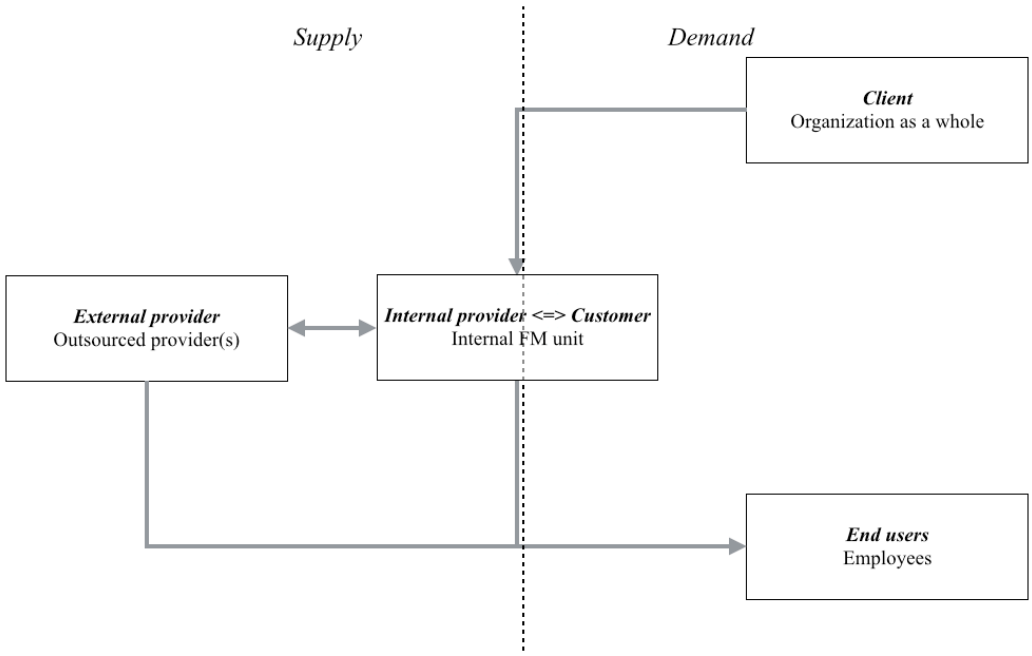

Figure 2: A visualisation of the value network of facility services.

The visualization in figure 2 is a simplification, as innovation processes within the facility service context also interest other external stakeholders, such as, for instance, the customers of the client organization's core business, society and so on (Coenen et al., 2013). Nonetheless, figure 2 offers a representation of the core of the stakeholder structure through which value is co-created in facility services, and might thus constitute a valid support to investigate the unfolding of value co-creation during open business model innovation processes within this field, which is why it was used here.

Methodology

This study investigates the unfolding of value co-creation throughout open business model innovation processes within the context of facility services. The research problem is closely linked to the issue of value co-creation, the quantification of whose outcomes still constitutes object of debate. Moreover, on the empirical side, the issue of innovation in facility services is still rather under-researched, which requires an explorative approach. Therefore qualitative research methods were considered as the most appropriate to answer the research question. More specifically, the methodology applied here is mainly inspired by the systemic combining proposed by Dubois and Gadde (2002). The research process, in fact, was characterized by the continuous evolution of the empirical and theoretical framework, along with the case analysis (Dubois & Gadde, 2002).

The research process started with the identification of the empirical field for the investigation. The empirical context of facility services was selected for two main related reasons, as explained above: the emergence of processes of open business model innovation as a consequence of the professionalization of the field of facility services offers (1) a critical case for the investigation of the research question (Yin, 2009); and (2) the possibility to transparently observe value co-creation, thanks to the recurrent and recognizable structure of the value network (Coenen et al., 2013).

The collection of data involved two related and overlapping phases: (1) an explorative study, generally aimed at understanding innovation and improvement processes within facility services; and (2) three mini-case studies (Weill & Olson, 1989) in three client companies—Companies 1, 8 and 13 (see table 1 below)—more specifically focused on investigating open business model innovation processes. Moreover, archival data were collected throughout both phases to ensure triangulation (Eisenhardt, 1989; Yin, 2009). The explorative study was necessary given the high degree of novelty that characterizes the study of innovation within the empirical field of facility services. During the explorative phase, the data were collected through 14 explorative, semi-structured interviews among 13 facility services organizations (at Company 9 two interviews were carried out, with representatives of global and local organization respectively), from clients to providers. For the mini-case studies 8 semi-structured, in-depth interviews, were carried out along with archival data collection. The interview guides for the in-depth interviews were built with the aim of collecting more details and examples on the open business model innovation processes, which were spotted during the explorative round.

The sample for the explorative study (table 1) included the two main types of facility service practitioners—clients and providers—within the Danish facility service field, who were selected with a combination of convenience (at the beginning of the study) and snowball (later on) sampling criteria (Eisenhardt, 1989) to ensure building a representative sample (Andriopoulos & Lewis, 2008; Eisenhardt & Bourgeois, 1988). All interviewees on the client side shared the responsibility of managing the internal FM unit, and were in charge of the business model innovation processes under investigation. On the other hand, the respondents on the provider side were senior managers or directors, i.e., with long-term experience concerning facility service provision and innovation. In addition, all providers but two (Companies 3 and 10) were working for one or more of the clients included in the sample, to include both perspectives on the same relationships and interactions. The heterogeneity of the sample, moreover, offered a rather good overview over the facility service field in Denmark, and allowed exploring the different perspectives on value co-creation within processes of open business model innovation. On the other hand, to increase reliability an interview protocol for the data collection was used and a

structured database was built (Yin, 2009) before being uploaded onto Atlas.ti for the data analysis.

Table 1: The sample for the explorative study

Company number	FM role	Core business	Number of employees	Position
1	Client	Financial services	32500	Head of Contract Management & IFM Development
2	Client	Logistics et al.	n.a.	Global Facility Management
3	Provider	Cleaning	300	CEO
4	Client	IT services	98000	Facility Manager
5	Provider	Hard FM services	8000	Market Manager
6	Client	IT services	430000	Real Estate Site Operations Manager
7	Provider	Hard FM services and FM consulting	6200	Senior Project Manager
8	Client	Industrial biotech	5500	FM Director
				FM Manager
9	Provider	Facility services	534500	Head of Knowledge Sharing and Engagement
				Commercial Director and CFO
				Segment Director
10	Provider	Real estate	370	Head of Operations
11	Provider	Technical FM	162000	Nordic Head of Projects
12	Client	Transportation services	5500	Facilities Manager
				Group Procurement Manager
13	Client	Telecom equipment	7500	Global Head of Facility Management

An important distinction needs to be done here. Among the interviewees there were two types of facility service practitioners: (1) clients and (2) providers. However, this work focuses on the business models of the customers, i.e., of the internal FM units of organizations, whose core activities are not related to facility services. As explained in the theoretical background section, the internal FM unit is both customer and provider, and requires an independent business model, which corresponds to the scope of this study. Please notice that all interviewees that are indicated

in table 1 within client organizations are in fact representatives of the internal FM units, i.e. internal providers and customers of facility services.

Throughout the data collection the literature was researched to find a proper matching between empirical world and existing research (Miles & Huberman, 1994). The constant comparison of theory and data was crucial for the identification of patterns of relationships among the concepts arising throughout the interviews. This supported both the sharpening and comparison of the theoretical constructs with the actual data (Eisenhardt, 1989). The qualitative data analysis software Atlas.ti (v.6) aided the analysis of the data, which, following Dubois and Gadde (2002), was carried out both during and after the data collection. The need for theory evolved throughout the research process, and was characterized by several episodes of re-direction (Dubois & Gadde, 2002), which supported the identification of the best analytical framework to address the research question.

The matching between the explorative study and the existing literature allowed narrowing down the research focus while the investigation progressed (Dubois & Gadde, 2002). From the explorative study value co-creation and the management of the stakeholders' network emerged as significant issues with regards to innovation within the context of facility services. The literature search enabled the identification of business model innovation processes as a proper lens to address those issues; and from the selection of existing literature an analytical framework of reference was designed (Dubois & Gadde, 2002). Such framework is explained in detail below, in the first part of the analysis of findings section. To strengthen the internal validity of the study, line-by-line, open and axial coding were carried out systematically, based both on the constructs emerged from the data and on the ones derived from the analytical framework. In addition, the detailed description of the research design and implementation are meant to support evaluating the reliability and validity of the obtained findings (Eisenhardt, 1989).

Both in the explorative and in-depth interviews the critical incident technique was adopted to ease the identification of the critical events connected to business model innovation within facility services. The critical incident technique has recently been used in a variety of service contexts to explore service research issues, and scholars have proved its reliability as method to be applied in service research (Gremler, 2004). Researchers have used the critical incident technique primarily in business-to-consumer contexts, although the characteristics of such method make it appropriate to use it also in a broader range of issues (Butterfield, Borgen, Amundson, & Maglio, 2005; Gremler, 2004), such as the cross-organizational business-to-business context investigated here. Following the recommendations by Butterfield et al. (2005), in this study respondents were explicitly asked to elaborate on the issues that arose throughout the interviews. The emphasis was set on examples of those events that made a significant, either positive or negative, contribution to the activities or phenomena that were being discussed

(Gremler, 2004). The critical examples that emerged from the data collection were then used in the analysis to understand how value co-creation unfolded within the open business model innovation processes under investigation. For instance, the phases and steps of the innovation processes were identified based on the critical examples that interviewees proposed in relation to each phase of the business model development.

Analysis of findings

The analytical framework: the process of business model innovation in services

The analytical framework that is used in this work combines the work of Amit and Zott on the business model construct and business model innovation (Amit & Zott, 2001, 2012; Zott & Amit, 2010) with the process perspective proposed by Sosna and colleagues (Sosna et al., 2010).

First, the work by Amit and Zott was selected as basis for the analysis because it allows moving within and across the layers of the business model and it includes the role of both internal and external stakeholders. Their definition of a business model, in fact, states that a business model depicts the content, structure and governance of transactions designed to create value through the exploitation of business opportunities. Table 2 reports the elements of a business model according to Amit and Zott (2001).

Table 2: The elements of the business model according to Amit and Zott (2001)

Business model content	Business model structure	Business model governance
Object of exchange between the organization and the external environment	Parties that participate in the exchanges	Controlling mechanisms by the involved actors for the flows of information, resources and goods
Resources and capabilities required to implement the exchanges	Links between the involved parties	Legal form of an organization
	Order in which exchanges take place	Incentives for the participants in the transactions

Amit and Zott (2001) propose a framework that allows asking a unique set of questions on value creation that could not be explained with prior frameworks. The framework combines the three elements of the business model construct with the four sources of value creation, which emerged from their data analysis: efficiency, complementarities, lock-in, and novelty. In their later work, the two scholars extended their focus outside the boundaries of virtual markets, and more generally addressed value creation in business model design (Zott & Amit, 2010) and business model innovation (Amit & Zott, 2012). The combination of the two sets of parameters introduced in Amit and Zott (2001) is thus confirmed as able to describe the sources of value creation behind the boundaries of virtual markets (Amit & Zott, 2012; Zott & Amit, 2010), which is why their framework was selected as basis of the analysis for this study.

Nonetheless, the focus of this paper is not on the sources of value creation *per se*, as in Amit and Zott approach, but rather on the unfolding of value co-creation. Their second parameter, i.e. sources of value creation, was therefore left out of the analytical framework, and substituted with a time line. The time line allows depicting how the three static elements of the business model evolve over time throughout the two main phases—and four stages—proposed by Sosna et al. (2010), thereby outlining how value co-creation unfolds during processes of open business model innovation. Based on the combination of business model and organizational literature, in fact, Sosna and colleagues argue that business model innovation consists of a trial-and-error process, which, despite being not linear, iterative and emergent, can be simplified into a life cycle model. Such life cycle is divided into two main phases, i.e., exploration and exploitation, and four stages: (1) initial business model design and test; (2) business model development; (3) scale-up with sustainable business model; (4) sustained growth through organizational learning (Sosna et al., 2010).

In short, selecting open business model innovation processes in the context of facility services as unit of analysis allows observing the interactions between stakeholders that are internal and external to the organizations under investigation, while at the same time uncovering how value is created, delivered and captured (Amit & Zott, 2001; Nenonen & Storbacka, 2010; Storbacka et al., 2013; Zott & Amit, 2010), or, in this case, co-created.

The findings: value co-creation throughout open business model innovation processes

Within internal FM units, business model innovation takes place by restructuring (a) internal organization and processes; (b) the network of relationships with internal and external stakeholders; and (c) the controlling mechanisms and incentives to stakeholders' active involvement. By working on these areas and their coordination, internal FM units are developing their own, independent business models, which can create value for the organization as a whole.

The results of the analysis indicate that the dynamics of value co-creation of the investigated business model innovation processes are strongly influenced by the type of relationship that is created and maintained between the FM units and their internal and external stakeholders throughout the business model innovation process. In other words, the nurturing of personal relationships between the actors involved emerged as crucial throughout both exploration and exploitation phases. Reciprocal trust, clear understanding of each other, as well as awareness of each other needs and expectations represent one of the most important element of the cooperation between stakeholders, and develop over time along with the formal relationships between parties. At the same time, stakeholders seems to exercise reciprocal impact on each other's business model, i.e., changes in the business model of the focal organization trigger innovation in the business model(s) of one or more of its stakeholders, and vice versa.

Table 3 reports the main findings of the analysis, organized according to the analytical framework, i.e., by (1) elements of the business model, and (2) stage of the business model life cycle. Please notice that the findings in the table do not refer to specific organizations, but rather to the aggregated results from the analysis. To obtain such results, axial codes corresponding to the categories in the framework were associated to the critical incidents emerged from the interviews. Each combination was then analysed to dig into the related dynamics of value co-creation.

Table 3: Analysis of findings-Value co-creation throughout open business model innovation in facility services

	Initial business model design and test	Business model development	Scale-up with sustainable business model	Sustained growth through organizational wide learning
Governance	• From no formalized governance to the allocation of facility service management to dedicated internal manager(s): creation of embryonic FM unit, usually managed as part of Procurement, and responsible for a limited set of services, usually for the HQs; • The newly appointed FM manager(s) get acquainted with the stakeholders and start collecting information on their needs and expectation; • Preliminary controlling mechanisms and incentives for stakeholders are designed and tested (e.g., data ownerships; partnerships instead of simple provision contracts etc.). *Value co-creation is supported by actively involving representatives of the client organization, i.e., the top management, and outsourced provider(s), in defining traits of the governance that would allow all stakeholders to gain benefits from the configuration; while end users are not involved.*	• An actual FM unit is formed and recognized as an autonomous entity within the client organization with responsibilities of a more or less broad set of facility services; • Communication with the stakeholders needs to be planned and implemented, to ensure that the right incentives for participation in transactions (but also in the value co-creation) are in place. *Value co-creation is supported by connecting with end users across the organizations to find out what is the current governance structure of facility service provision, as typically each department and/or building has one or more employees, who, without mandate, take care of the facility services because "it is fun". Once identified the current informal governance, dedicated interactions with the top management ensure a certain degree of centralized controlling mechanisms.*	• The FM unit achieves global and centralized responsibilities over facility service provision: while it still reports to the top management, it has now control of all (or almost all) facility service-related task for the HQ, and for the major ones across the global client organization; • Communication with the stakeholders becomes even more crucial to support incentives for participation, as it is not only local actors that need to be taken into consideration, meaning that geographical, cultural, and work pattern-related differences need to be taken into consideration: communication is bi-directional, i.e., not simply about communicating what facility services are about, but also collecting information about stakeholders and coordinating value co-creation. *Value co-creation is supported by establishing control mechanisms that are centred on collaboration with local actors, and not hierarchies between the HQ and the periphery.*	• What has been learned at the local level (i.e., at the HQ, where the FM unit was created in the first place) now needs to be applied on the global level: the FM unit gains control over all facility service provision around the world. • The incentives for participation of the stakeholders need to be revised and potentially revised to fit the global heterogeneity. *Value co-creation is supported by making sure that stakeholders are involved in the decision-making that is relevant to each specific set of needs and expectation: top management cooperates with the FM unit in defining the boundaries of the global controlling mechanisms and incentives (to make sure the needs of the organization as a whole are taken care of); end users support the definition of incentives for their participation; outsourced providers negotiate their contracts to ensure settings that would allow them to capture a share of the co-created value.*

Structure	The following questions need to be answered: • Who will take care of the service provision internally, i.e., who is going to be in charge of the embryonic FM unit? • Which outsourced provider(s) should be hired? • Which type of contract should be signed with the outsourced provider(s), e.g., activity-based or output-based? • Which kind of relationship should be established with the outsourced provider(s)? • Which kind of relationship should be established with the client (top management) and the end users (employees)? *Value co-creation is supported by actively interacting with stakeholders at different levels of the client organization and with the outsourced providers. This ensures that the interested parties may express their needs and expectation, which in turn supports building links and relationship that would benefit each stakeholder.*	• The structure of the actual stakeholder network needs to be understood: who are the stakeholders, and how are they connected to the FM unit? How are interactions with stakeholders managed? How can the relationships with stakeholders be improved? • The centralized governance requires an appropriate structure, which is in this stage defined by raising awareness of the role and position of the FM unit within the client organization, as well as strengthening the ties with the outsourcer provider(s). *Value co-creation is supported through the active involvement of stakeholders in defining the structure of relationships, for instance by organizing workshops with the employees of the outsourced providers, or stimulating bi-directional communication between the FM unit and the end users.*	• The FM unit grows as a global team is built by combining local facility managers; • The FM unit is still connected to top management the same way, but the link with the end users change: as the organization goes global, more and more heterogeneous needs and expectation come into play; • Depending on geographical, cultural, and work pattern-related differences the relationships with the local outsourced providers are sometimes confirmed, sometimes discontinued to consolidate the service provision on a global scale. *Value co-creation is supported by strengthening relationships with local stakeholders, and building relationships with global ones. The process usually starts by getting in touch with the local FM managers and outsourced providers, trying to consolidate links, relationships and interactions.*	• As the organization grows and achieves global governance and centralized control of all facility services, so does the net of relationships with local and global stakeholders: constant care is required to ensure that the proper structure is in place to ensure continued interaction with all parties; • To keep on growing, constant monitoring of the parties that participate in the exchange is necessary, so that links can be adjusted in case a specific set of need and expectation changes. *Value co-creation is supported by close interaction between central and peripheral stakeholders to co-create, maintain and adapt over time a structure of relationships that would benefit all parties.*

Content	The following questions need to be answered: • Which facility services and which quality level would ensure the correct functioning of the organization? • Which competences should internal facility service managers have? • What budget is needed and what budget is available to ensure the proper level of support services? *Value co-creation is supported out by interacting with:* • *The top management, representative of the client organization, and the employees, to establish the best compromise between the overarching needs and expectations of the client and the individual ones of the end users;* • *The outsourced provider(s) to define the object of the outsourcing contract(s), and to outline which resources and capabilities will be provided and which will have to be acquired/developed internally.*	The actual management of the facility services is now a major concern: • How can a good balance between cost competitiveness and dedicated services be ensured? • Which synergies and complementarities between services can be exploited? • How to develop cost transparency? *Value co-creation is supported not only by discussing each issue with the outsourced provider(s), but also with external parties, such as managers of other FM units or academics. Knowledge sharing, workshops, benchmarking exercises and so on are carried out not only for the sake of acquiring information, but also to co-create value in the industry: each FM unit benefits from the experiences of other units, and aggregated value is achieved when facility services are better managed, as awareness rises, and so availability of resources allocated to FM units.*	Expanding from local to global scale means more and more heterogeneous facility services to be provided: • Which services should be provided locally, and which globally? • Which global standards should be aimed for, and which local differences should be maintained? • How to balance between the local and global needs of the organization? • How to balance between the local and global needs of the individual end users? *Value co-creation is supported by organizing dedicated meetings with the local facility managers and outsourced providers, in which differences and similarities are discussed and the content of the business model is built in cooperation between local and global (internal and external providers). In addition, cooperation with the top management is required to ensure that the right resources are allocated to the new global organization. Finally, individual end users are asked to cooperate in the definition of the content of the scaled-up business model.*	The focus is on transparency and increased efficiency: • How are services provided around the world? • How do the established global standards relate to local differentiations? • How can synergies and complementarities between local and global services be exploited? • How can we transfer learning from local experiences to a global scale? • How can we take local resources and competences to a global scale? *Value co-creation is supported by sharing the decision making with all stakeholders, so that it is ensured that all necessary services are being provided and that all parties capture a share of the co-created value, be it through monetary reward, better managed processes or higher satisfaction.*

Discussion of results

The analysis of findings indicates that, in facility services, value co-creation unfolds during processes of open business model innovation thanks to the continuous interactions between the focal organization—the internal FM unit in this study—and its internal and external stakeholders. Such interactions result in value co-creation because they are not aimed at unidirectional support, i.e., one party offers ideas to the other for the only benefit of the latter. On the contrary, many of the interactions between stakeholders that take place during the business model innovation processes of internal FM units are aimed at supporting the creation, distribution and appropriation of value by and to both parties in cooperation, i.e., they are aimed at ensuring value co-creation.

Given that the business model of an organization depicts the ways the organization creates, delivers and captures value (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Doz & Kosonen, 2010), it can therefore be argued that value co-creation unfolds throughout processes of open business model innovation due to the intertwining of the business model innovation processes of the focal organization and its stakeholders. This result confirms and extends existing theories on business model innovation to the service context, and allows proposing a conceptual framework for the understanding of value co-creation over time, in which processes of open business model innovation are taken as unit of analysis. In this section, the findings are discussed in relation to existing literature, and the framework is introduced.

First of all, existing literature underlines the role of interdependencies between business models of related organizations, and stresses how, within their ecosystem, business models can act in isolation or in interaction between each other (Sanchez & Ricart, 2010). The results depicted here extend such argument, originally limited to the low-income markets, to the service context, in which isolation is not possible due to the co-production feature that is typical of services (Bryson et al., 2012; den Hertog, 2010; Gago & Rubalcaba, 2006). Furthermore, Storbacka and his colleagues stress that only a comprehensive view over the network of stakeholders will help firms realizing the value creation potential inherent in a transformation toward solution business (Storbacka et al., 2013). This study reveals that a comprehensive view is necessary, but not sufficient: the business models investigated here appeared as not only externally oriented, but also interdependent. As a consequence, business model innovation processes of diverse stakeholders were intertwined, which created the need for proactive cooperation between stakeholders at different inter- and intra-organizational levels to achieve value co-creation.

Second, the findings presented here strengthen the arguments according to which organizational experimentation, trial-and-error learning as well as agility and adaptability are crucial for value co-creation (Lusch et al., 2009; Sosna et al., 2010). In fact, being flexible in the

way stakeholders are called in to cooperate allows distributing over time different aspects of value co-creation to different stakeholders because of two main reasons. On one hand, openness in the business model innovation process might support value co-creation, from which all the stakeholders can benefit (Nenonen & Storbacka, 2010). On the other hand, the diversity of stakeholders within the context of facility services, and in services in generally, actually requires a certain degree of openness to present and discuss the reciprocal needs and expectations in the short and long term. Adding to those arguments, this study shows that each set of stakeholders is called in to cooperate in the business model innovation when the decision-making to be implemented is relevant to their needs and expectations, and, in turn, this supports value co-creation for all stakeholders in various situations and at different points in time.

Finally, the findings show that the dynamics of interaction depend on the relationship that is built among the involved actors, where the role of personal communication and trust was found to be crucial. The supporting nature of facility services, in fact, eases knowledge sharing practices, but it is the 'personal chemistry' among the interacting parties that determines the degree of openness. The important role of personal chemistry identified in this analysis confirms and extends the results by Tikkanen et al. (2005) on the intertwining within business model innovation of material aspects, such as the contract that formally regulates the relationships among actors involved in inter-organizational interactions, and cognitive perception, which define such interactions and their outcomes in practice. Therefore, it is here argued that not only internal processes and management evolve over time (e.g., Achtenhagen et al., 2013; Casadesus-Masanell & Ricart, 2010; Demil & Lecocq, 2010; Doz & Kosonen, 2010; Sosna et al., 2010), but also that the relationships with stakeholders, as reciprocal trust, personal relationships and awareness of each other needs and expectations develop along with the stakeholders' business models.

In summary, this study suggests that, in facility services as well as in other service contexts, interactions between stakeholders go beyond cooperation and towards value co-creation. Although the two phases and four stages of the business model life cycle (Sosna et al., 2010) appear to be overlapping and rather fluid, a time-based business model innovation framework allows depicting how: (1) changing one of the elements of the business model of the focal organization—the FM unit in this study—triggers changes in the business models of its stakeholders; and (2) the business model innovation process of an organization is not only determined by endogenous decision, but also by changes in the business model of its stakeholders. Value is co-created by and for all stakeholders when there is a match between (1) the innovated business model of the internal FM function; (2) the corporate business model; and (3) the business models, needs and expectations of the external actors involved, i.e. suppliers, consultants and fellow clients involved in the value co-creation. Therefore, the framework that was used for the analysis of findings may be extended by adding a third dimension, i.e., business

models of stakeholders (figure 3), which describes the unfolding of value co-creation through the intertwining of business model innovation processes of a focal organization (on the x-axis) and its stakeholders (on the y-axis) over time (on the z-axis).

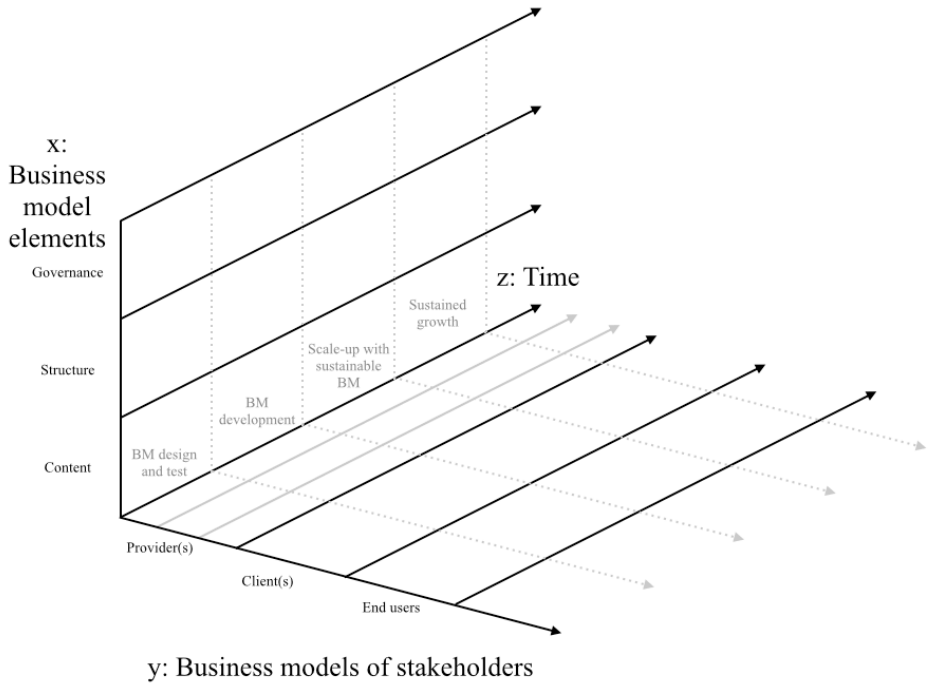

Figure 3: The proposed conceptual framework.

The conceptual framework in figure 3 combines the elements of the business model construct (Amit & Zott, 2001) with the time perspective of the business model life cycle (Sosna et al., 2010), and extends it by including the business model elements of the stakeholders along with the related innovation processes. In the figure, only the four stakeholders addressed in this study are reported, although the framework may potentially include broader sets of stakeholders (which is why the y-axis terminates with an arrow).

Such conceptual framework has both theoretical and practical implications. First, with regards to theory, it implies that an organization trajectory is the result of the intertwining between emerging trends and events *related to the business models of the stakeholders* with the results of its deliberate decision. The concept of dynamic consistency proposed by Demil and Lecocq (2010) is therefore extended beyond the interdependency between elements of the business model (Achtenhagen et al., 2013; Amit & Zott, 2012; Demil & Lecocq, 2010; Mäkinen & Seppänen, 2007; Morris et al., 2005; Zott & Amit, 2010), to the interactions between stakeholders. The construct of *dynamic and interactive consistency* proposed here complements the existing argument that business models of related organizations interact (Sanchez & Ricart,

2010; Storbacka et al., 2013; Tikkanen et al., 2005), by showing how processes of business model innovation are in fact intertwined and co-evolutionary when aimed at value co-creation. The framework does therefore not only apply to services, as it refers to value co-creation, which, according to the SDL and to the open innovation literature, should be aimed for in all contexts, i.e., manufacturing, services and experiences (e.g., Vargo & Lusch, 2004; West et al., 2014).

Second, the conceptual framework proposed here also has implications for praxis, as it offers to service organizations, who want to ensure and support dynamic and interactive consistency throughout their business model innovation processes, a tool to map the business models of their stakeholders and their evolution over time. By combining the business models and time in a three-dimensional matrix, in fact, the conceptual framework in figure 3 visualizes the interdependencies between business model innovation processes of stakeholders. By extending Demil and Lecocq work on dynamic consistency, the framework might therefore support (1) the monitoring of risks and uncertainties; (2) the anticipation of potential consequences of changes in stakeholders' business models; (3) the implementation of deliberate action to maintain dynamic and interactive consistency.

Conclusions

This work addressed the research question: *How does value co-creation unfold throughout open business model innovation processes within the context of facility services?*

The results of the study outline that, within the service industry, value co-creation unfolds through open business model innovation processes as relationships between and among stakeholders evolve along with the business model, through the development of reciprocal trust, personal relationships, and better awareness and understanding of each others' business model. In other words, value co-creation requires dynamic and interactive consistency, i.e., each organization must be attentive to changes in others' business models to prepare for proper reaction. Most importantly, dynamic and interactive consistency extends beyond reaction, as interactions with stakeholders and close cooperation may be organized strategically to involve the right actors for each specific stage of the business model innovation process.

By pointing out how value co-creation unfolds throughout processes of open business model innovation within the context of facility services, this study contributes to the existing literature on innovation in services. In fact, it responds for the call for research on new ways of thinking about innovation in the services industries, such as business model innovation (Carlborg et al., 2014; Rubalcaba et al., 2010; Toivonen & Tuominen, 2009), and adopts a process perspective to value co-creation by taking business model innovation processes as unit of analysis. More specifically, this study investigates the interdependency of business model elements over time (Achtenhagen et al., 2013; Amit & Zott, 2012; Demil & Lecocq, 2010;

Mäkinen & Seppänen, 2007; Morris et al., 2005; Zott & Amit, 2010) within the service context, where interactivity and co-production play a major role for innovation, and outlines the intertwining of business model innovation processes across stakeholders. The conceptual framework proposed here therefore contributes to service research as it outlines how service providing organizations not only interact with each other through co-production, but actually co-create value over time by dealing with the interdependencies between their business models and the ones of their stakeholders, i.e., throughout open business model innovation processes.

Practitioners may also benefit from this study, which stresses the importance of dynamic and interactive consistency for business model innovation and offers a tool, i.e., the conceptual framework, that might be used to map, understand and strategically plan value co-creation throughout open business model innovation. Despite the empirical focus on facility services, the results from this study might applicable to other service contexts as well thanks to the focus on value co-creation, although further research is required to test applicability in different context and thus increase external validity (Lee & Baskerville, 2003).

Nevertheless this study is not free of limitations. First and foremost the data collection took place within a rather small set of practitioners in Denmark. Therefore the research question requires further investigation, for example through the analysis of more in-depth interviews and archival data, in Denmark and possibly abroad, to ensure stronger validity of results. In addition, further research is required to test the applicability of the research in other contexts than facility services, thereby increasing the external validity of the findings and of the conceptual framework.

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PAPER 2

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Please notice that this paper follows the guidelines of Research Policy and thus adopts the Harvard style of referencing instead of the APA style (6th edition), which is used in the rest of the dissertation.

STAKEHOLDER DIALECTICS AND INNOVATION IN SERVICES: A PROCESS PERSPECTIVE

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Abstract

Services are characterized by the involvement of stakeholders in the innovation process. The aim of this study is to understand how and why tensions and potential conflicts between heterogeneous stakeholders unfold during processes of innovation in services. The empirical context in which the investigation was set is facility management services, a type of business-to-business support services.

The findings were extracted from a longitudinal, in-depth case study, complemented with an explorative study in the Danish field of facility management services. The longitudinal case study follows the development of facility management services within a Danish, multinational organisation over a time span of 8 years, from the de-merge from its mother company up until the end of 2013. The findings suggest that tensions and conflicts between heterogeneous stakeholders are an intrinsic element of innovation processes in services, and that emphasizing them might actually support a clearer understanding of processes of innovation in services. The outcome of the analysis is a process model, which proposes a novel concept, i.e., stakeholder dialectics, as one of the driving mechanisms of innovation in services.

Keywords: innovation; services; process; stakeholder dynamics

Introduction

In today's uncertain and fast-moving environment the relationship between supply and demand has evolved, as globalization and the development of information and communication technologies have increased competition and introduced more and more complexity in interactions between parties (Teece 2010). As one of the consequences, a larger range of actors can participate in innovation processes, which implies heterogeneity of needs and expectations that innovators have to consider when developing new offerings. Such heterogeneity of needs and expectations, in fact, creates inner tensions between stakeholders, which might result in conflicts and thus have a negative impact on the innovation process and its outcomes (see, for instance, Sjödin & Kristensson 2012). From existing literature we know that innovation processes trigger conflicting demands from different customers, along with contradictory practices among the managers and competing views, i.e., tensions and conflicts, among all stakeholders (van Dijk et al. 2011; Erez et al. 2013). This might either boost or inhibit performance, which is why managers tend to seek improvements in the management of innovation processes; while the fast-changing environment and the complexity of internal processes makes tensions and conflicts more and more hard to deal with (Lewis 2000; Erez et al. 2013).

This suggests that the interactions between stakeholders might represent a crucial issue to address when managing innovation processes, and particularly so within the service context. Services tend to involve customer participation in the service process (whether such participation is planned or not) and to be: (a) simultaneously produced and consumed; (b) perishable; (c) intangible; and (d) heterogeneous (Fitzsimmons & Fitzsimmons 2006). Concerning interactions between stakeholders in services, previous research depicted the importance of co-production between service providers and customers as one of the main distinguishing characteristics of service innovation as compared to tangible products. Significant research effort was invested into role of and requirement for user involvement in service innovation (e.g., Alam & Perry 2002), and even more studies have been carried out to investigate the collaboration of different parties within new product development processes (e.g., Nambisan 2002; Chesbrough 2006; von Hippel 1986). Nevertheless, interactions between providers and customers, and, more generally, stakeholders, have often been presented as collaborative (e.g., Alam 2002; Bitner et al. 2008; Ettlie & Rosenthal 2011; Kuusisto & Riepula 2011), so that tensions and potential conflicts during innovation processes still require attention and dedicated research.

Overlooking the tensions and potential conflicts that are inherent to innovation processes, and presenting collaboration between different parties as a collaborative and easy-to-handle exercise, creates a masked, even edulcorated, picture of reality. Not only this might cause misunderstandings for practitioners, who would approach stakeholder involvement in innovation

processes with naive expectations on the required management skills and potential outcomes, but also limit the theoretical representation of innovation practices. This paper aims at overcoming the limitations of existing literature by exploring tensions and potential conflicts among heterogeneous stakeholders with a dedicated focus on innovation processes in services. Through a qualitative, longitudinal investigation of process data on innovation in services, this study exposes the unfolding of tensions and potential conflicts between the stakeholders of a focal entity to answer the following research question:

How and why do tensions and potential conflicts between heterogeneous stakeholders unfold during processes of innovation in services?

The unit of analysis for this study is tensions and potential conflicts between stakeholders of innovation processes: the analysis follows the emergent relationship between the development of tensions and potential conflicts and the development of innovation processes over time. The data collection and analysis for this study were centred on the development of a type of business-to-business support services, i.e. facility management (FM) services, over an 8-year period in a Danish, multi-national organisation.

Theoretical foundations

According to Den Hertog (2000), four main dimensions describe a new service: (1) new service concept; (2) new client interface; (3) new service delivery system; (4) new technological options. Any service innovation involves a certain blend of these dimensions (den Hertog 2000). This implies that when talking about innovation in services, we do not only refer to new services, but also to new organisational settings, processes and technologies, which allow the service provision (Drejer 2004). Consequently, the literature on innovation in services is broad and still developing, which implies that different approaches, perspectives and theories are being used to investigate both variance and process issues. While variance research aims at establishing the conditions necessary to bring about an outcome, by treating change as a variable, process methods go beyond surface descriptions of change to penetrate the logic behind temporal progressions. Process research should identify the generative mechanisms that cause observed events to happen in the real world, and the related contingencies or circumstances (Van de Ven & Poole 2005; Tsoukas & Hatch 2001). Despite the on-going debate on the management of innovation in services, the majority of study follows a variance approach, which is nonetheless not appropriate to investigate how tensions and potential conflicts unfolds during processes of innovation in services. Therefore, to uncover tensions and potential conflicts between stakeholders of innovation processes in services, I adopted a process approach, as explained in further detail in the methodology section of the paper.

In the following paragraphs, I review existing research on innovation in services, which adopted a process approach, based on Van de Ven and Poole (1995) typology of process theories and motors of change (Figure 1). The typology is based on two dimension: (1) the unit of change, i.e. single or multiple entity/-ies; and (2) the mode of change, i.e. prescribed or constructive. A prescribed mode of change channels the development of entities in a pre-specified direction, typically of maintaining and incrementally adapting their forms in a stable, predictable way. On the other hand, a constructive mode of change generates unprecedented, novel forms that, in retrospect, often are discontinuous and unpredictable departures from the past. It thus produces new action routines that may or may not create an original reformulation of the entity (Van de Ven & Poole 1995).

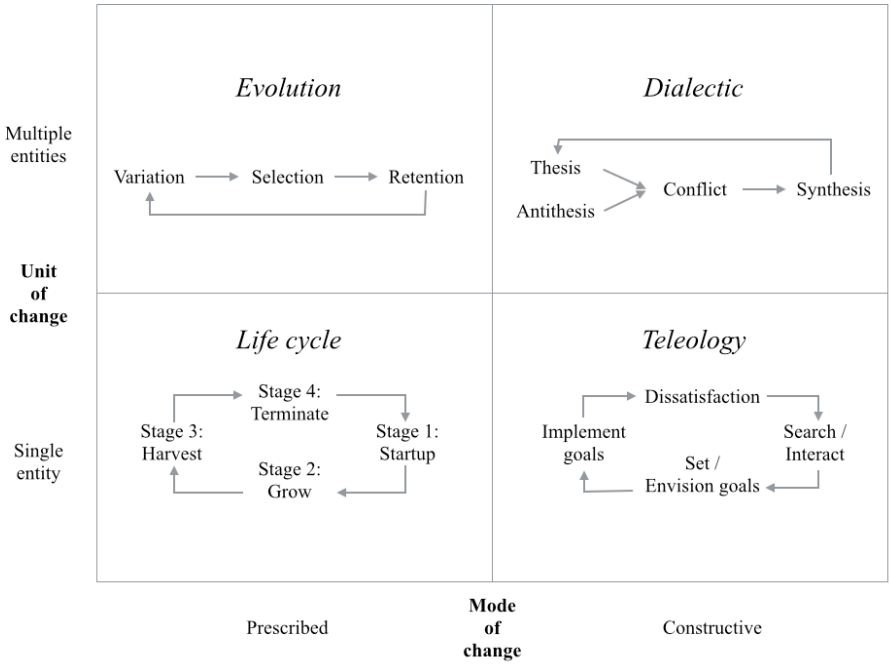

Figure 1. Typology of process theories (Adapted from Van de Ven and Poole, 1995).

Innovation in services: process perspectives

A systematic literature search on ABI Inform (Webster & Watson 2002), scoped to research that investigated process issues within innovation in services, suggested that there is a limited amount of studies on innovation in services that adopt a process approach. The 34 articles, which resulted from the search, were analysed in depth and classified by motors of change as visualised in Table 1.

	Prescribed mode of change	Constructed mode of change
Multiple units of change	Barras 1986	Edvardsson and Olsson 1996
	Ettlie 1979	Chae 2012
	Ordanini and Maglio 2009	Flikkema et al. 2007
	Barras 1990	
	Fuglsang, Sundbo and Sørensen 2011	
	Matthing, Sandén and Edvardsson 2004	
Single unit of change	Miles 2008	Sundbo 1997
	Cardellino and Finch 2006	Edvardsson et al. 1995
	Miles et al. 2000	Martin and Horne 1993
	Chan, Go and Pine 1998	Kuusisto and Riepula 2011
	Bitner et al. 2008	Drejer 2004
	Ottenbacher et al. 2006	
	Gallouj and Weinstein 1997	
	Scheuing and Johnson 1989	
	Abramovici and Bancel-Charensol 2004	
	Ettlie and Rosenthal 2011	
	Melton and Hartline 2010	
	Busse and Wallenburg 2011	
	Alam 2013	
	Alam 2011	
	Mota Pedrosa 2012	
	Alam 2012	
	Alam and Perry 2002	
	de Brentani 1991	
	Johne and Storey 1998	
	Alam, 2002	

Table 1. Classification of existing literature in services by motors of change.

Within the process research on innovation in services two models prevail: (1) the stage-gate, or R&D-driven (e.g., Alam & Perry 2002; de Brentani 1991; Scheuing & Johnson 1989), and (2) the practice-driven innovation model (e.g., Sundbo 1997; Edvardsson et al. 1995). Both models emphasize single units of change, i.e. the innovation process driven by a specific service provider, but they refer to the two opposite modes of change, respectively prescribed and constructed.

The stage-gate model was mainly developed through hypothesis testing methods, grounded in the literature on R&D-driven new product development, and specifically with the model by Booz, Allen and Hamilton (Booz 1982). Stage-gate model researchers postulate that service providers do (and, if they do not, they should) follow the example of manufacturers, and

structure their innovation activities in formalized steps and phases (Alam & Perry 2002; Scheuing & Johnson 1989; Miles 2008; Ottenbacher et al. 2006). In Chan, Go, and Pine (1998), for instance, it is argued that Honk Kong's service firms are not innovative as in other realities, such as USA, because their innovation activities are unstructured, overlapping and informal. Some of the studies stress that the phases do not necessarily need to be sequential, but might be overlapping, depending on the drivers and on the circumstances (Cardellino & Finch 2006; Miles et al. 2000). The major critiques to the stage-gate model applied to innovation in services highlight that such model is too strongly grounded in new product development literature, and therefore fails to incorporate some of the inner characteristics of services as compared to tangible goods, including the fuzzy distinction between service (and innovation) process and service (and innovation) outcome (Martin & Horne 1993; Fuglsang et al. 2011; Ettlie & Rosenthal 2011).

An important turning point in the literature on innovation in services can be found in the work on Martin and Horne (1993) about the reasons for success of service innovation firms. By comparing successful and unsuccessful service innovating firms, Martin and Horne explored several dimensions of innovation in services, and concluded 'services just come about, but are then managed with highly sophisticated management tools' (Martin & Horne 1993, p.49). The work by Martin and Horne (1993) represents a significant contribution to the literature on innovation in services, as it launched research on the so-called practice-driven model of innovation, afterwards developed through theory building and inductive methods, aiming at representing the most intangible nature of services. The practice-driven model, in fact, presents innovation in services as an trial-and-error, overlapping process, where change processes are started and managed in response to market opportunities and/or customer dissatisfaction, and, only after commercialization, improved and recognized as innovation processes and outcomes (Edvardsson et al. 1995). In the practice-driven model, we therefore see the constructed mode of change in action on a single unit of change, the innovation process of single organisations. Nevertheless, the constructed mode does not appear to be working on its own, as research on the practice-driven model also reports systematic practices and strategically driven innovation projects as being typical of services (Sundbo 1997; Gallouj & Weinstein 1997; Edvardsson et al. 1995).

More recent work on both the constructed and the prescribed mode of change tackles the issue of involving customers in the service innovation process, while still focusing on a single unit of change (Alam 2002; Alam 2011; Alam 2013; Bitner et al. 2008; Abramovici & Bancel-Charensol 2004; Kuusisto & Riepula 2009; Melton & Hartline 2010; Busse & Wallenburg 2011; Mota Pedrosa 2012; Johne & Storey 1998). Scholars have shown the potential of customer involvement as beneficial to innovation in services, and highlighted that customers can be involved through various methods for active and passive contribution, both within stage-gate

(Alam 2002; Alam 2011; Alam 2012; Alam 2013; Bitner et al. 2008) and practice-driven (Ettlie & Rosenthal 2011; Kuusisto & Riepula 2009) innovation processes. Nevertheless, the process of collaboration for innovation has most often been presented as a rather prescribed unfolding of relationships, and tensions and potential conflicts have not been explicitly addressed so far. Yet, the presence of such tensions has been recognized by scholars of innovation in services (see, for instance, Sundbo 1997). More specifically, Sjödin and Kristensson (2012) pointed out the negative effects of unsuccessful customer involvement, which signals the relevance of dedicated research effort in that direction.

Barras is one of the pioneers of research on innovation processes in services and the first to tackle multiple units of change (Barras 1990; Barras 1986). According to Barras' view, the service industry differentiates itself from the manufacturing one through a reverse product cycle, which begins with incremental process innovation, improved efficiency; and moves forward through radical process innovation, improved quality, toward product innovation, new services (Barras 1986). While such reverse product cycle has been critiqued for reducing innovation in services to a cycle driven by technological development (e.g., den Hertog 2000; Gallouj & Weinstein 1997), it represents one of the few efforts to investigate prescribed modes of change with multiple unit of analysis in innovation in services. Also Ordanini and Maglio (2009) explore prescribed change in innovation in services by emphasizing multiple units of change, but with a different approach: they see customer involvement not as a tool to improve the management of innovation processes, but rather as a dynamic change process in itself. The decision tree that Ordanini and Maglio propose represents the parallel, interactive and reciprocal development of change across the service provider, the customers and the external stakeholders, e.g., suppliers and competitors (Ordanini & Maglio 2009). Fuglsang et al. (2011) and Matthing, Sandén, and Edvardsson (2004) also emphasize the teleological motor, by presenting models of practice-driven and interactive innovation: structured innovation processes, but not necessary sequential, and, most importantly, open to external inputs.

Finally, only three studies emphasize the constructed mode of change for multiple units of change, by stressing how, in the service context, the innovation process develops on a parallel track with customer involvement, driven either by the evolution (service process) or the dialectic (customer process) motor, depending on how structure and systematic the innovation process is managed (Flikkema et al. 2007; Edvardsson & Olsson 1996). Chae (2012) goes a step further, and conceptualizes innovation in services as an evolutionary process, which, nonetheless, corresponds to what Van de Ven and Poole (1995) call dialectic: a constructed mode of change, taken place in multiple units, in this case multiple innovation processes and customer involvement processes. The motor of innovation is in fact here described as interactive; local; multi-dimensional; unpredictable and emergent (Chae 2012).

Van de Ven and Poole (1995) stress that their typology does not present four independent motors, but rather four dimensions of change within organisation. The distinction between the four motors allows simplifying the complex reality of change processes, whereas ideally to fully understand a specific process of change, such as innovation in services, all four motors, and combinations thereof, should be explored (Van de Ven & Poole 1995). One of the most evident gaps, which appear from this classification of existing literature on innovation process in services, is the investigation of multiple units of change. More interestingly given the purpose of this study, existing research, despite recognizing the role of stakeholder involvement (especially customers) still fails to tackle tensions and potential conflicts that might emerge during innovation processes in services.

This study tackles some of the limitations in previous literature by emphasising the dialectic motor, and uncovers tensions and potential conflicts among heterogeneous stakeholders within innovation processes in services. Dialectic processes, in fact, describe the sequence by which the thesis and anti-thesis confront and engage each other in a conflict struggle. Events leading to confrontation of opposites and resolutions may occur intermittently over the course of development, and the result of the conflict is a synthesis that breaks the current frame, and typically produces a revolutionary change (Van de Ven & Poole 1995). Therefore, the emphasis on the dialectic motor is achieved by taking tensions and potential conflicts between stakeholders of innovation processes as unit of analysis and following their development over time.

Research context and methodology

The process approach and theory building from case study research

The empirical focus of process research is evolving phenomena, and the theorizing explicitly incorporates the temporal succession of events (Van de Ven & Poole 2005; Langley et al. 2013). In this study I adopted a process approach to innovation in services, as it allowed exploring the unfolding of tensions and potential conflicts among heterogeneous stakeholders during innovation processes. Organisations, and units thereof, are here defined as identifiable entities that develop over time, where development is a change process that unfold throughout the duration of the entities' existence (Klarner & Raisch 2012). Based on Van de Ven and Poole (1995, 2005) I refer to process as the progression of events in an organisational entity's existence over time, and to change as a succession of movements in a recognizable entity over time. Moreover, I consider outcomes as 'inputs that are made sense of in determining further activity, and not in terms of static performance' (Langley et al. 2013, p.10).

To ensure a systematic approach to process conceptualization, I combined the process methodology by Langley et al. (2013) with some of the research tools depicted by Eisenhardt (1989) to guide theory building from case study research. First of all, I carried out a structured

literature review to (1) build the grounds of the investigation; (2) identify the research objective; and (3) specify the a priori constructs (Eisenhardt 1989). I then selected the empirical context for the investigation, and entered the field for the data collection and analysis, as described in the following paragraphs.

The empirical context: FM services

A service context, where heterogeneous stakeholders are clearly identifiable and tensions transparently observable, is business-to-business support services, such as FM services. Business-to-business support services, like FM and information technology services, in fact, are responsible for making sure that the employees of the organisation they serve can carry out the tasks and activities related to the core business, without having to worry about, for example, the management and maintenance of their workplace or the functioning of information and communication technologies. Furthermore, due to their support nature, in large organisations it often results more economically efficient to – at least partially – outsource their provision to external, specialized providers. When this happens, diverse internal and external actors participate in the innovation processes and take along heterogeneous sets of needs and expectations, which might cause tensions and eventually conflicts (Coenen et al. 2013).

To tackle the research question, I therefore selected FM services that are partially or totally outsourced to external providers among other business-to-business support services. FM researchers have spotted the role of innovation for added value within the FM context (Jensen et al. 2012), the ability to innovate of FM practitioners (Cardellino & Finch 2006; Mudrak et al. 2005) and the need for partnership approaches to bridge between demand and supply when developing and implementing innovation (Goyal & Pitt 2007). Yet, FM literature lacks emphasis on the demand side of innovations (Coenen et al. 2013), and for what concerns innovation processes only the life-cycle motor (Cardellino & Finch 2006) has been considered so far.

The diversity of internal and external stakeholders, i.e. the organisation as a whole, its employees and customers, and the internal and outsourced providers, and of their needs and expectations make of FM services a relevant and critical case (Yin 2009), in which relationships and exchange dynamics between parties are crucial elements of development and change. On the other hand, in FM services interactions, and more specifically tensions and conflicts between parties, are transparently observable, as diverse stakeholders appear to have characteristics, needs and expectations that are similar within groups, heterogeneous between groups and yet comparable across different cases (Coenen et al. 2013).

Data collection

I chose qualitative research methods for this study as they correspond well to a perspective emphasizing process questions and to processes rather than variables as primary focus of attention

(Rasche & Chia 2009; Langley et al. 2013). I collected process data, i.e. longitudinal, rich and varied, through both interviews and archive data (Lehoux et al. 2014; Geels 2002; Bohnsack et al. 2014). While longitudinal data are necessary to observe how processes unfold over time, archive data support interview data for tracing events chronologies, meanings and discourses over long periods of time (Langley et al. 2013). Please notice that in accordance to the confidentiality agreement with the organisations involved in the study, only quotes from the interviews (and not from the archive data) are reported ad verbatim in the paper.

The selected population is the Danish field of FM services to control for environmental variations and clarify the domain of findings as FM service (internal and outsourced) providers (Eisenhardt 1989). Theoretical sampling in course of research (Eisenhardt & Bourgeois 1988) was carried out in two subsequent phases. I started with an explorative study (Miles & Huberman 1994) in the Danish FM context, where sampling took place according to convenience, at first, and snowball, later on, criteria (Eisenhardt 1989), to ensure variety and overcome network limitations in the initial phases of the investigation. The explorative study included (1) 16 explorative and in-depth semi-structured interviews; (2) archive data collection from primary (interviewees) and secondary (Internet) sources; (3) literature review on specialized FM research; (4) passive observation in workshops and conferences for FM researchers and practitioners from 2011 to 2013. The explorative study allowed to collect interactional expertise, which helped relate to specialized practitioners and better understand their ways of dealing with change and innovation processes in general (Langley et al. 2013). Such preliminary investigation was in fact aimed at shedding light on innovation processes within the context of FM services, and, more importantly, at theoretically sampling a critical case where tensions and conflicts between stakeholders of innovation processes in services were transparently observable (Eisenhardt 1989).

The unit of analysis, i.e. tensions and potential conflicts between heterogeneous stakeholders, were explored within the development of FM services as provided by the internal FM unit of a Danish, multi-national organisation. The service providing under investigation was examined over a time period of eight years, from the foundation in 2005 until 2013 through a longitudinal, in-depth case study (Langley 1999). The longitudinal perspective allows examining the relationships and exchanges – and therefore tensions and conflicts – between stakeholders during innovation processes at different stages of the organisational development (Drori & Honig 2013). In addition, such research setting is attractive because it allows, within the development of the FM service provided by the FM unit, to investigate multiple processes of innovation of diverse nature and causes, which nevertheless took place between the same set(s) of stakeholders. Following den Hertog's definition, four dimensions of innovation in services are in fact taken into consideration in this study: (1) new service concept; (2) new client interface; (3) new service delivery system; (4) technological options (den Hertog 2010).

The case study design can be defined as embedded (Yin 2009; Guerard et al. 2013) as, to increase the number of theoretical observations, and thereby enable the identification of specific theoretical mechanisms recurring over time, I applied temporal bracketing (or decomposition, Langley et al., 2013; Langley, 1999). Within the stream of longitudinal data from my main case study, I identified four main instances of tensions and/or conflicts between stakeholders, which were intertwined with innovation processes. These temporal brackets (de-merge crisis; financial crisis; global shift; organisational change) are constructed as progressions of events and activities that are separated by identifiable discontinuities in the temporal flow (Langley et al. 2013). To spot such discontinuities and determine the most appropriate temporal brackets I applied the critical incident technique (Gremler 2004). Researchers have used the critical incident technique primarily in business-to-consumer contexts, although the characteristics of such method make it appropriate to use also in a broader range of issues (Butterfield et al. 2005; Gremler 2004), such as the cross-organisational context investigated here. Each temporal bracket identified in this study represents an instance (critical incident) of innovation process, because they all imply a change in one or more of the dimensions of innovation as defined by den Hertog (2000).

The data collection aimed at shedding light on the development process of the FM services under investigation and related stakeholders, and included 7 in-depth, semi-structured interviews of 45 to 90 minutes with main representatives of the internal FM unit and of the main external provider. I started with general questions on the history of the unit, and explicitly asked respondents to elaborate on the critical issues that arose during the interviews, with emphasis on the examples of those events that made a significant, either positive or negative, contribution to the activities or phenomena that we were discussing (Gremler 2004). Once I had identified the main critical incidents and thereby the temporal brackets, the interviews aimed at shedding light on different aspects, events and innovation processes that took place during each period. To avoid memory bias (Eisenhardt 1989), identify with greater precision the dates of the critical incidents and enrich the database (Langley 1999; Yin 2009), I complemented the interviews with archival data (Guerard et al. 2013) on the development of the FM unit, which included reports, strategy plans, communications and so on.

Data analysis

Since the beginning of the explorative study, the data analysis overlapped the data collection (Eisenhardt 1989). First, I took field notes through interview reports and memos, during and after the explorative interviews and other encounters with FM practitioners, e.g., seminars and conferences. Second, I implemented a flexible, yet systematic data collection throughout both the explorative and the in-depth case studies, which was aimed at a better grounding of the theory building. In fact, I adjusted the interview protocols during the data collection on the basis of the emergence of interesting themes. I also modified the initial plan for the sources of data, by adding

in-depth interviews in the cases, where the explorative study highlighted relevant (similar or contrasting) evidence with the main case (Eisenhardt 1989). Finally, I built a database that incorporated field notes, ad verbatim transcripts of the interviews and archive data.

To aid the data analysis I used the software Atlas.ti, v.6, where I transferred the database and implemented several steps of line-by-line, open and axial coding. For the analysis of the data I was inspired by Langley's (1999) strategies for theorizing from process data, and used narratives both for the within-case analysis and the following cross-case analysis (Eisenhardt 1989). Eisenhardt (1989) warns against the risks of poor information processing, and suggests applying a structured and diverse approach to cross-case analysis. For this study, I (1) selected categories and dimensions in the data to look for within-group similarities and inter-group differences; and (2) selected pairs of periods, and searched for similarities and differences between each pair (Eisenhardt 1989). To strengthen internal validity, ensure consistency of relationship within and across temporal brackets and abstracting from the particular to the general, I implemented open and axial coding based both on the constructs emerged from data and on those derived from existing literature (Langley et al. 2013).

Finally, I combined the guidelines of Eisenhardt (1989) and Langley et al. (2013) for reaching closure in the study. In the explorative study, I stopped collecting data when I felt I had reached theoretical saturation as incremental learning felt minimal on the processes that were being investigated. In the in-depth case study, I derived the four periods from temporal bracketing, and stopped collecting data on the processes for a combination of pragmatic considerations (issues related to time and financial resources) and saturation, i.e. the last interviews did not offer significant contributions to the emergent theory on value co-creation processes. Also the iteration between data and theory was interrupted when saturation was reached, i.e. when additional literature did not significantly contribute any further to the emergent theory (Eisenhardt 1989; Langley et al. 2013).

Findings

The FM services, whose innovation processes are looked at in this study, are those provided to Novozymes, a Danish, multi-national organisation (6200+ employees). The core business of Novozymes lies within industrial biotechnology, with a strong focus on enzyme production (Novozymes 2013). The set of stakeholders under investigation includes: (1) the developing internal FM unit, from here on also referred to as NZ FM; (2) the organisation, from here on also referred to as NZ, which is supported by such unit, and (3) its employees, who are served by NZ FM; (4) the outsourced providers.

The analysis of the focal case starts in 2005, when NZ de-merged from its mother company, Novo Nordisk. The intertwining between tensions and conflicts between NZ

stakeholders and the innovation processes carried out in such network developed over time and went through four critical phases, or temporal brackets: (1) de-merge crisis; (2) financial crisis; (3) global shift; (4) organisational change.

The de-merge crisis

When NZ de-merged from its mother company, it shortly realized that it needed to figure out how to deal with FM services, which were previously taken care of by the FM unit of the mother company. An embryonic FM unit was created, composed by a director from the Purchasing unit, who could initially only dedicate 20% or his time to make sure that FM services were allocated efficiently to the employees. Soon after the de-merge, he had to re-negotiate the contract with the outsourced provider, and, together with NZ executive management, decided to discontinue the existing relationship to obtain better conditions, e.g., more transparency, cost competitiveness and better services.

> *We were negotiating a new agreement and they (the outsourced provider, ed.) told us that we should look at the new agreement they had written for us, and we couldn't change it. And we had one week to decide if we accepted that agreement or not. (31:10-11; interview with FM director)*

A major conflict arose as the decision to discontinue the relationship caused the refusal by the former external FM service provider to share any information and/or data about the past FM service provision to the embryonic FM unit. This meant that the latter had to start from scratch in figuring out how to ensure that employees could carry out the activities related to the core business, without noticing the on-going shift of providers. This conflict caused the threat of a mismatch between the needs and expectations of NZ and its employees and the needs and expectations of the embryonic FM unit, and thus of a potential conflict between stakeholders. On one hand, the employees expected (and were expected by NZ executive management) to be able to carry out core business activities as usual. On the other hand, the embryonic FM unit expected (and, yet again, was expected by NZ executive management) to ensure the best possible deal for NZ in terms of transparency, low cost and dedicated services.

> *We didn't get any help from out former supplier and if we wanted any documentation, we should have paid for it… So we said 'Ok, keep your information, we build it up from the beginning… And some of the services were critical issues, because we did not know anything about it, and that could hard our R&D… (31:12; interview with FM director)*

The FM manager and the executive management acknowledged the potential mismatch, and yet proceeded to discontinue the contract with the external provider. The goals now was to find new providers of FM services, who would be able to ensure the functioning of the core business at the lowest possible expense – also in terms of satisfaction of needs and expectations of the employees.

We didn't know exactly who was the supplier and what was the cost… We ranked different areas and different focuses, and talked how we should handle that… If you go back to 2005, there was not a strategy, it was damage control… (31:11-12, 29; interview with FM director)

In addition, significant effort was invested into designing and implementing a communication strategy that would explain the on-going changes to NZ employees, thereby limiting dissatisfaction and related tensions with the newly appointed internal and external FM providers.

The financial crisis

Once the initial challenges were faced and external providers selected, NZ FM became an actual independent unit reporting to vice president of Stakeholder Relations. The director from Purchasing, who led the process since the de-merge, was appointed director of the FM unit, and new managers were hired.

The newly born FM unit was responsible for a limited amount of FM services (real estate; technical maintenance and renovation; cleaning and catering; logistics) at NZ headquarter in Denmark, while the other FM services (and all of them in other NZ sites around the world) continued to be managed by 'regular' employees within the local units, based on specific needs and personal preferences.

In the production (…) maybe they should focus on what is the core business of production. And that's definitely not to take care of building maintenance, even if they could do it. (55:18; interview with FM director)

The more NZ FM developed, the more needs and expectations of the organisation as a whole and of the employees with regards to FM services became sophisticated, and moved from the operational to the tactical and strategic level. While more and more FM services were assigned to the NZ FM unit, an exogenous shock hit NZ: the financial crisis. When the financial crisis reached Denmark, in fact, NZ executive management asked to reduce the budget for service provision to the FM unit.

One of the trends we saw very early in the regression of the financial crisis, was that space usage became important to focus on: how could we avoid disagreements outside our building portfolio, how could we optimize space usage primarily in the office buildings that we owned, to avoid costs. (53:6; interview with DK FM manager)

The exogenous shock introduced to NZ with the financial crisis generated the mismatch between the expectations of the employees, used to high level services, and the needs of the executive management, which turned its attention to FM services as potential source of cost savings. One of the side projects, which were originated in connection to the financial crisis, was the reduction of travel expenses. NZ is a multi-national organisation, which implies that its employees are often required to travel within and outside of Europe. However, with the financial crisis hitting

Denmark and NZ, a new travel policy was implemented that included the plan for implementing new information and communication technologies to reduce traveling. NZ FM unit was therefore involved in the development and implementation of videoconference rooms, which offer a realistic meeting experience, and have thus supported a significant reduction of travel-related costs – but also individual burdens for the employees, such as jet lag. While the FM unit was not directly responsible for the project, it was involved in innovation process related to it. NZ FM, in fact, cooperated with other internal units to find the best possible solution to ensure the balance between the needs of the employees and those of the executive management. While the videoconference solution cannot substitute personal communication, it still offers an innovative and satisfactory experience that ensures a balance of needs and expectations between the involved stakeholders.

> *People want to meet face-to-face, and if they see that they can meet face-to-face in a very efficient way with these technology solutions, maybe they are less keen on traveling abroad and using lots of time and money on traveling. And in fact that worked very well. People are very happy to use tale-presence technologies and not just traveling to the US for a meeting or two. (53:25; interview with DK FM manager)*

The global shift

By 2009, NZ FM was composed by a team of FM managers led by a FM director, who operated at the Danish level and reported to the VP of Stakeholder Relations. Other than managing FM services in the best possible interest for the employees, NZ FM started working on the development of some 'transparency tools' that would ease the communication with the executive management. The goal of transparency has been one of the major drivers of NZ FM development right from the start, i.e. de-merge, with the aim to achieve a better quality-cost ratio for the FM services. In addition, transparency could support better communication with the executive management, which in turn resulted in increased awareness of the potential contribution that FM services could offer to the core services.

> *Our executive VP learned that we could create this transparency, that we could boil all these excel sheets and work orders and energy invoices and all that (…) and create some understanding of what's important, what's to be prioritized, where should we pull money, and put money (…) so it was very much easier for him and his leader group to make the right decision on how to spend FM money the right way. (30:20; interview with DK FM manager)*

The idea of extending the responsibilities of NZ FM outside the Danish sites and building an FM unit to manage FM services on a larger scale (in other NZ sites around the world) started to be developed once the executive management had realized the potential of a proper management of FM services. With the aid of an academic FM research, a knowledge sharing exercise was carried

out with 10 other Danish, multi-national companies, to explore how FM services could be managed. Two main dimensions were investigated: (1) centralisation, and (2) globalisation.

> *We interviewed 10 big global Danish companies, and based on that we went to our executive management and presented what are the other companies doing (…). Based on that we got a mandate to start a project to see if we should start a global organisation. (55:2; Interview with FM director)*

The knowledge sharing provided the inspiration for a globalization project, which was called GFM (Global Facility Management) and initiated in 2011. The GFM project was launched to identify the similarities and differences between FM services in Denmark and around the world. The emphasis was not only on the FM services themselves, but also on the needs and expectations of local employees and executive management, along with the cultural differences in people's behaviour, rules and regulations.

The plan for a global organisation carried along the risk of creating an imbalance between the satisfaction of local employees and the goals and objectives of the centralized management. Such risk was dealt with by creating a team of FM from the different sites interested in the project to map local needs and expectations, and compare them with the potential global requirements and standards. While the team was dislocated in the different sites, the FM managers kept in touch through videoconferences, telephone calls and quarterly meetings that allowed keeping a grip on the local interests while trying to establish a common strategy.

> *So building maintenance was one large IT challenge, space management the highest priority, and the third challenge was when we started the GFM through and had to invite all our colleagues to discuss how should FM perform in NZ. Communication was very important. (53:8; Interview with DK FM manager)*

The organisational change

In April 2013, the CEO, who had led NZ since the 1990s, retired, and the new CEO introduced several organisational changes right away. Some of these changes had a direct impact on NZ FM and the provision of FM services. First of all, the new organisational structure put NZ FM together with all other support services, under the responsibility of the vice-president of Global Business Services.

> *We got a new CEO… What he did was to put an organisation in place, which is more flexible… He decided to take away all these 'non-core' activities, functions, responsibilities and put them into corporate functions… We are at the moment on a journey to provide NZ with the right services together with other corporate functions… It was decided to create a 'global business centre' or business service unit, led by a vice-president. (56:2; Interview with ROTW FM director)*

Second, the FM unit was divided in two entities, led by two FM directors: one responsible for Denmark (DK FM), and one for the Rest-Of-The-World (ROTW FM). The goals and objectives of the GFM were transferred to the newly born ROTW FM unit, which basically had to define the scope of its service provision from scratch once again.

> *We are going to have resources; we are going to have dedicated support from the rest of the global functions to run and drive our way forward. (56:3; interview with ROTW FM director)*

The organisational change thus created a mismatch between the needs and expectations of the executive management and the newly re-organised FM organisation, and the needs and expectations of the employees. On one hand, the novel ROTW FM unit is grounded in the strategy and ambition to develop an FM organisation built on strong efficiency and global standards. On the other hand, the employees all around the world are used to the decentralized management of FM services, which implies that there is a higher attention being paid to individual requests, at the expense of efficiency.

> *We need to optimize what we are doing, we need to standardize and we need to be better to predict and to be at the right place in the right time. (...) There is not yet a red line (common thread, ed.) for going through how we do stuff. (...) And we need to map these; we need to be in control. (...) It is not only about a global footprint, it's also about getting in control locally! (...) Every time somebody needs a new chair, needs to paint or wants to increase our security, they go to her (a local FM manager, ed.) and she fixes it. (56:7; Interview with ROTW FM director)*

The goal of the new set-up is not only to reduce costs, however, but rather to improve the global provision of FM, to ensure the balance between the needs and expectations of the organisation as a whole and the end-users, wherever they are located around the world, which means that differences between local sites need to be taken into consideration and adjusted to the local reality when developing and implementing global standards.

In the meanwhile, DK FM has focused on the original goals to maintain its continuous development: transparency; improved efficiency; improved quality/cost ratio. Having managed to establish a solid balance between the needs and expectations of different stakeholders at the operational level, DK FM has begun a process to identify the potential additional areas of contribution to the core business. For instance, one of the current issues, on which DK FM is working on, is the improvement of the workspace, based on (1) the availability of resources by the client organisation; and (2) the need and expectations of the end-users, e.g., how much time employees spend in their offices vs. in meeting rooms. The DK FM unit is therefore participating in a benchmarking program with other Scandinavian organisations, led by a specialized FM consultant, to (1) map and evaluate the needs and expectations of its internal stakeholders, and

related levels of satisfaction; (2) be inspired on how similar or contrasting needs and expectations are managed in other environments for further potential developments.

Stakeholder dialectics as driver of innovation processes in services: a dialectic process model

A recurring finding across the observed innovation processes is that, although the different stakeholders tend to have a specific role and be positioned on a specific level within the organisation, when a change, caused either by exogenous shock or endogenous decision, is introduced into the system, they often are confronted with other parties. As a consequence of this, each set of stakeholders needs to deal with issues, needs and expectations, which belong to a different level. This causes tensions between stakeholders, who would want to have their needs and expectations to be satisfied – even at the expense of other stakeholders (although this is not always the case). In turn, such tensions trigger a dialectic motor of change, which I here call stakeholder dialectics. Dialectic processes describe the sequence by which the thesis and anti-thesis confront and engage each other in a conflict struggle (Van de Ven & Poole 1995). Stakeholder dialectics is thus defined as a constructive mode of change that takes place within a network of two or more stakeholders, and that generates a break with the past basic assumptions that regulate their relationship. Table 2 illustrates the functioning of the dialectic motor of change in the case of Novozymes, by summarising and organising the findings derived from the case of Novozymes by critical incidents (or temporal brackets).

	2005-2013 INNOVATION PROCESSES AND TENSIONS BETWEEN STAKEHOLDERS				ZOOM IN
	Period I **The De-Merge Crisis**	**Period II** **The Financial Crisis**	**Period III** **The global shift**	**Period IV** **The organisational change**	**Single service innovations**
Triggering change incident	Endogenous change: de-merge of NZ from mother company	Exogenous change: emergence and impact of financial crisis on Danish economy and consequently NZ	Endogenous change: decision to centralize and globalize FM service provision	Exogenous change: new CEO implementing significant organisational changes with both short- and long-term consequences	Endogenous change and/or exogenous shock
Emergent issue	How should FM services be managed?	How can FM service provision be more cost efficient without compromising the implementation of core business activities?	How can we manage FM services with a centralized and global organisation?	How can we provide FM services given the new organisational setting?	How can the match between needs and expectations of heterogeneous stakeholders be ensured when developing new services or improving existing ones?
Thesis	NZ FM: More cost competitiveness and better services than before the de-merge	NZ: Lower budget for FM services	NZ FM: Centralized and global FM management	NZ and NZ FM: Strong efficiency and global standards	Needs and expectations of one (or more) sets of stakeholders
Antithesis	External provider: Same conditions as before the de-merge	NZ employees: High level FM services	Local NZ FM managers: local FM management	NZ employees: Individual, local and cultural differences	Needs and expectations of other set(s) of stakeholders
Conflict	NZ and NZ FM vs. External provider	NZ vs. NZ employees	Headquarter NZ FM vs. Local FM managers	NZ and NZ FM vs. NZ employees	Unbalanced needs and expectations
Synthesis	Discontinued contract with external provider	New travel policy and video-conference facilities (among other solutions)	Creation of GFM team to find balance between specialization and standardization of FM services on global scale	Separated yet parallel management of FM services in Denmark and in the ROTW	New service and/or improved service

Major innovation outcome(s)		New client interface (including new external providers)	New technological options	New service delivery system	New service delivery system	New service concept; new client interface; new service delivery system; new technological option(s)
	NZ	Higher cost competitiveness	Lower resources to allocate to FM services	Increased transparency	Improved global FM service provision	
	NZ FM	Better agreement and partnership-like relationship with new external providers	Increased responsibilities in terms of strategic cost reduction management	Global responsibilities	Separation of strategic responsibilities (DK FM) and operational responsibilities (ROTW FM)	
	NZ employees	Different client interface, e.g., new employees of external provider to deal with and different standards	New perception of support service consumption (higher awareness of support service costs)	Different standards for certain FM service features	New services and different, global-based standards for existing services	
Impact on stakeholders	External providers	(New providers): Partnership-like relationship with internal provider	New expectations from NZ and NZ to support cost savings	Not involved (agreements still local)	Global agreements (for some providers)	

Table 2. Integrative summary of findings.

As the table displays, in the case of NZ FM development thesis and anti-thesis are respectively (1) new needs and expectations of one (or more) set of stakeholders, originated by the introduction of a change into the system; and (2) existing needs and expectation of other stakeholders. The conflict is the mismatch of needs and expectations resulting from the confrontation of diverse stakeholders, which eventually resolves in a synthesis. The arrow in the table represents the new status quo that each synthesis represents on the next period. Only one arrow is visualized here to keep the table readable, but there are meant to be three, each representing a synthesis feeding into the next period.

Zooming into innovation processes for new or improved single services highlights the same mechanisms: for instance, when NZ FM started its activity as a formalized unit, the team realized that the employees' need for meeting rooms was not completely satisfied in the current set-up. However, budget and space restrictions (the needs of the organisation as a whole) did not

allow offering additional rooms – which caused a tensions and potential conflict between NZ executive management and NZ employees. The synthesis of the mismatch, i.e. the attempt to create a balance between such needs and expectations, consisted in the development of a walk-and-talk path as meeting room alternative:

> *We started sending out newsletter… and (the end-users requested, ed.) 'We want some new meeting areas, and more meeting rooms'. Because we did not have so many meeting rooms as we needed, we proposed people to meet in the reception and we arranged some walk-and-talk routes. So if they wanted to have a green area they could be in the nature, or shortly walk around the buildings so and so many times… and people have been very fond of that. (55:10; Interview with DK FM director)*

Based on these findings, I propose a process model of innovation in services centred on the dialectic motor of change, and driven by stakeholder dialectics (Figure 2).

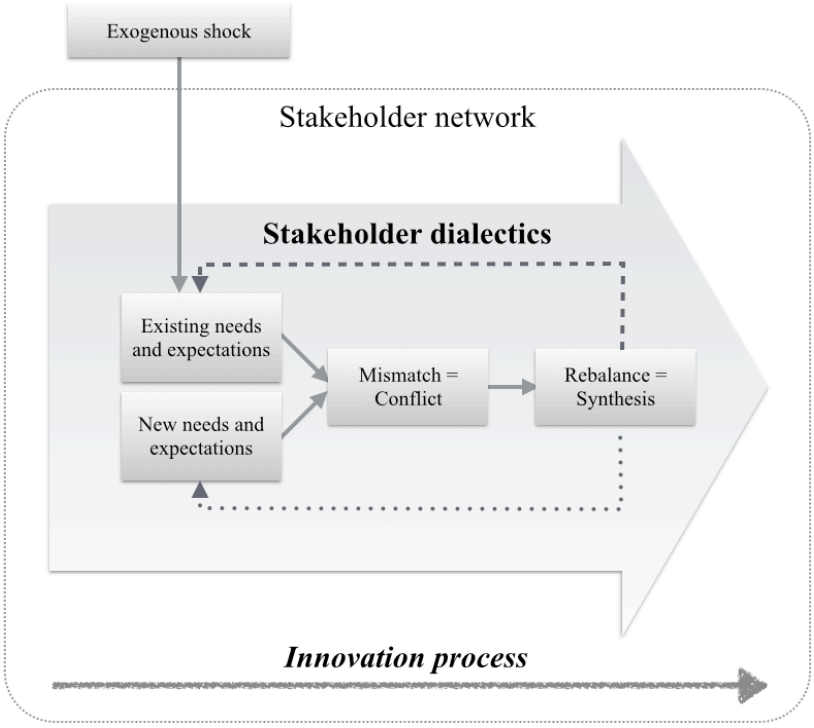

Figure 2. Stakeholder dialectics: a dialectic driver of innovation in services.

Stakeholder dialectics are triggered by change, which can be originated by an exogenous shock, coming from outside the network of stakeholders, or an endogenous decision by one of the parties involved. Endogenous change is here defined as a change that is originated within the focal stakeholder network and directly linked to the decision making for the innovation processes under investigation, e.g., the decision to discontinue the agreement with the existing suppliers. Exogenous shock, on the other hand, is a change originated outside the focal network, which cannot be controlled by the stakeholders and is not directly linked to the innovation processes

under investigation, e.g., the financial crisis. The change of CEO, for instance, can be considered as an exogenous shock as independent from the decision making of the stakeholders involved in innovation processes related to FM services, who had to accept the organisational changes that the new CEO implemented, and deal with the related consequences.

When change is introduced into the system, stakeholder dialectics kick-in, as new needs and expectations (of one or more stakeholders) are confronted with the existing ones. The mismatch of needs and expectation, in turn, results in an explicit or implicit conflict, which is resolved by re-balancing the interests of the different parties. Finally, the synthesis feeds back into the process, as (1) new status quo for some stakeholders (dashed line in the figure) and as (2) endogenous change for others (dotted line in the figure). In the model, stakeholder dialectics are represented as a big arrow, as they are intended as a transition, and not a status, through which heterogeneous stakeholders drive innovation processes through the tensions and conflicts originated by their un-matching needs and expectations. The succession and combination of various episodes of stakeholder dialectics is what constitutes the innovation process, and contribute to eventually reaching innovation outcomes. The proposed model of innovation in services stresses the mismatch of needs and expectation of different stakeholders as one of the driving forces of innovation in services, and sees the succession and combination of various episodes of stakeholder dialectics as constituting the innovation process, and contributing to eventually reaching innovation outcomes.

Discussion

This study is centred on the research question: *How and why do tensions and potential conflicts between heterogeneous stakeholders unfold during processes of innovation in services?*

In this discussion section, I will present my proposed answer to this question, by presenting the findings just illustrated in relation to the existing literature on innovation processes in services.

The unfolding of tensions and conflict during innovation processes in services

The longitudinal analysis of the development of the FM service provision at NZ over time allowed for the identification of patterns across various processes and dimensions of innovation. These common patterns reflect the driving role that tensions and conflict between stakeholders play with regards to innovation processes that I have here presented with the phrase stakeholder dialectics. At the same time, the data indicate that the trigger of tensions and conflicts might derive either from an exogenous shock, on whose impact the stakeholders have no control, or from an endogenous change, which might actually be derived from a previous episode of stakeholder dialectics.

Early literature on innovation in services identified the potential tensions that might arise among the stakeholders of innovation processes (Sundbo 1997). Later on, as presented above, process research on innovation in services developed over two main stream of thought. On the one hand, some scholars built on new product development models and proposed formalized and structured processes as the way to develop new services and improve existing ones (e.g., Alam & Perry 2002; de Brentani 1991; Scheuing & Johnson 1989). On the other hand, the intangible nature of services was taken into stronger consideration and practice-driven processes arose (e.g., Martin & Horne 1993; Edvardsson et al. 1995; Sundbo 1997; Gallouj & Weinstein 1997). What both streams failed to consider is the emergence of tensions and conflicts between the heterogeneous stakeholders of innovation in services, despite the increasing interest in customer, and more generally stakeholder, involvement. This study contributes to the theory on innovation in services as it suggests that tensions and conflicts unfold along with innovation processes, as every step that is carried out constitutes an unsettlement of the status quo, which, in turn, might originate a mismatch between needs and expectations of the stakeholders.

The dialectic motor of innovation in services

The process model proposed here does not aim at substituting previous models of innovation processes in services. Rather, it contributes to a clearer understanding of innovation processes in services, as it describes the involvement of a motor of change, the dialectic one, whose action has been recognized, yet not extensively researched. The construct of stakeholder dialectics and the process model centred on it, in fact, confirm the interactive, local, multi-dimensional, unpredictable and emergent nature of innovation processes in services as argued by Chae (2012). At the same time, the identification of stakeholder dialectics as one of the driving mechanisms of innovation in services supports the position of Flikkema et al. (2007) and of Edvardsson and Olsson (1996), who argue for the co-existence of prescribed and unplanned processes within innovation in services, when multiple units of change are taken into consideration.

The dialectic model proposed here, in addition, might extend what we know about service development and customer involvement, because it explains what happens throughout the trial-and-error, overlapping processes that are at the centre of the practice-driven model of innovation (Edvardsson et al. 1995; Sundbo 1997). Previous research has stressed that ‘services happen’ (Martin & Horne 1993) and that customer involvement might increase the rate of success of innovation when dedicated methods and tools are used to cooperate and co-develop with customers and other stakeholders (Ettlie & Rosenthal 2011; Kuusisto & Riepula 2011). Based on the findings obtained for this study, I argue that not only collaborative processes, but also emerging tensions and conflicts between heterogeneous stakeholders drive innovation processes in services.

Stage-gate models, on the other hand, tell us that innovation in services should be formally managed, both in case of closed strategy and customer involvement (e.g., Alam & Perry 2002; Kuusisto & Riepula 2011). While the dialectic model I propose explains the functioning of the constructed mode of change, a reflection upon stakeholder dialectics and the role of tensions and conflicts between different parties within the prescribed mode of change might contribute to existing models by proposing an additional tool to drive formalized processes of innovation: expectation management. In addition to actively and passively involve customers (Alam 2011; Alam 2002; Alam 2013; Bitner et al. 2008), in fact, it might be beneficial for innovation to constantly monitor the needs and expectations of different parties, to prevent potential mismatches and be prepared to handle tensions and conflicts before their actually emerge.

Conclusions

The purpose of this study was to explore how and why tensions and conflicts between heterogeneous stakeholders unfold during processes of innovation in services. Based on the inductive investigation of innovation processes in the empirical context of FM services, this paper argues that such tensions and conflicts unfold because of the mismatch between the needs and expectations of diverse stakeholders, and that their resolution represents a step toward innovation. The data collected and analysed for this study, in fact, suggest that tensions and conflicts are an intrinsic element of innovation in services. More interestingly, tensions and conflicts between stakeholders appear to trigger the dialectic motor of change; which is why I propose the construct of stakeholder dialectics as one of the driving forces of innovation in services.

While I do not argue that stakeholder dialectics represent the only force behind innovation processes in service, this construct is introduced in this paper as one of the crucial mechanism for innovation within the service context. I propose a dialectic model that adds a piece to the puzzle, thereby contributing to our understanding of innovation processes in services. Firstly, this paper tackles the dialectic motor of innovation in service, so far under-researched, by emphasizing the constructed mode of change between multiple units of change. Secondly, this study explicitly focuses on tensions and conflicts between heterogeneous stakeholders, whereas existing literature had so far presented rather smooth processes even in case of involvement of different parties. Finally, the findings indicate that, whether we are considering a prescribed or a constructed mode of change, and regardless of how innovation processes in services are, or are not, managed, the dynamics between stakeholders matter in determining the actual unfolding of the process.

Theoretically, this implies that models of innovation in services might benefit from a process approach that does not only consider the development of new service concepts, new client interfaces, new service delivery systems and new technological options, but also the dynamics of

stakeholder involvement and cooperation. If we accept the argument by Van de Ven and Poole (1995) that to gain a complete understanding of a specific type of change process we need to explain all four motors and combinations thereof, scholars should be well motivated to further develop the process perspective on innovation in services. Future research should both exploit existing theories on the four motors and explore the related combinations through multiple perspectives. The work on service innovation systems by Edvardsson and colleagues, for instance, already goes in this direction. In fact, it proposes a combination of prescribed and constructive modes of change with multiple units of change, although it still does not explicitly address tensions and conflicts between stakeholders. It might therefore represent a good ground for further research on the dialectic motor of innovation in services and on multiple units of change, if enriched with a stronger focus on problematic dynamics such as the ones described in this paper.

On the practical side, this work is especially relevant for innovators, who deal with heterogeneous networks of stakeholders, such as virtual and business-to-business support service providers. Practical recommendations include a strong focus on expectation management when introducing novel services and/or changes in the network, as well as when dealing with exogenous shocks, that might somehow unsettle the needs and expectations of one or more sets of stakeholders. Mapping the structure of the network and the needs and expectation of involved and potential stakeholders might support the identification of potential mismatches, which in turn might prevent and/or support a smoother management of tensions and conflicts.

Nevertheless, this paper is not free of limitations. More work is needed to test the robustness of the process model of innovation in services based on stakeholder dialectics. The database, on which this study is built, was enriched with data until a certain degree of theoretical saturation was achieved, and the research design was explicitly made structured and systematic through reliable research strategies, such as temporal bracketing. The results are however derived from a limited sample of service providers, and within a specific context, i.e. business-to-business support services. Further investigations are necessary to understand to what degree the model proposed here is applicable to other service sectors and eventually to a manufacturing context.

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PAPER 3

Nardelli, G. (2015). The interactions between innovation in services and ICT: A conceptual typology. International Journal of Information Systems in the Service Sector, 7(3).

THE INTERACTIONS BETWEEN INFORMATION AND COMMUNICATION TECHNOLOGIES AND INNOVATION IN SERVICES: A CONCEPTUAL TYPOLOGY

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Abstract:

Recent literature reveals the increasingly important role of Information and Communication Technologies (ICT) within innovation in services. This paper aims at outlining how scholars have conceptualized and defined the relationship between ICT and innovation in services so far, by analysing the fragmented body of knowledge available on the topic, to strengthen the research area as field of study and support its progress. The results of the literature review were derived through a concept-centric analysis of the existing research on ICT and innovation in services. The outcome of the literature review is a conceptual typology that organizes and summarizes the body of knowledge on ICT and innovation in services, and reveals the critical knowledge gaps along with an agenda for future research. The main contribution of this work resides in having organized existing literature on the relationship between ICT and innovation in services into a conceptual typology. The conceptual typology outlines the three main aspects of the link between ICT and innovation in services: the integration of organizational and innovation processes; the cooperation among internal and external agents; and the self-reinforcing innovation mechanism that characterizes ICT as a product.

Keywords: Information and Communication Technologies; service; innovation; literature review; conceptual typology; process integration; innovation processes; organizational processes; cooperation; self-reinforcing innovation mechanism.

Introduction

Innovation has become a crucial element of survival for organizations within every industry due to the crucial changes that are affecting modern economies (Atilgan-Inan, Büyükküpçü, & Akinci, 2010). With the advent of Information and Communication Technologies (ICT), services have become an important locus of innovative activity (Metcalfe & Miles, 2000). Recent innovation literature has dedicated extensive attention to the link between ICT and New Product Development (NPD). Even though some scholars have argued that manufacturing and service industries share more similarities than differences (Evangelista, 2000; Forsman, 2011; Jong & Marsili, 2006), service innovation research stresses that NPD models are only partially appropriate for services (Aas, 2011; Sundbo, 1997; Tether & Tajar, 2008). More and deeper knowledge on the relationship between ICT and innovation in services is still needed to cover theoretical gaps that prevent a deeper understanding of innovation within the service context (Tether & Tajar, 2008) and to support practitioners in their quest for value creation.

A preliminary literature review around the terms "ICT", "service" and "innovation" shows that scholars have looked at these topics from several angles and with diverse scopes and objectives. Tether and Tajar (2008) outlined the need for more knowledge on the intersection between these three topics and called for more research effort to discover hitherto neglected aspects of innovation that are found across the economy, especially for what concerns the complementarities between technology and other types of innovation. Since their call for research, many scholars have dedicated their attention to ICT and service innovation (Bygstad & Lanestedt, 2009; Chesbrough, 2011; Targowski, 2009). On the one hand, the availability of diverse research supports the development of new knowledge. On the other hand, the heterogeneity of existing literature might make it harder to identify critical un-investigated topics when planning and executing research on ICT and innovation in services.

This paper aims at contributing to the development of literature on innovation in services by presenting a thorough literature review on the relationship between ICT and innovation in services. The novelty of this work stands in the systematic and structured analysis of the fragmented body of knowledge on the topic, and, more specifically, in considering both sides of the connection: not only the impact of ICT on innovation, but also the effect that innovation has on ICT adoption, development and implementation. The outcome of the literature review is a conceptual typology that organizes existing literature on ICT and innovation in services. Moreover, the literature review enables (a) identifying different perspectives on ICT and innovation in services, by outlining five umbrella themes in the body of knowledge; (b) spotting critical research gaps that might guide future inquiries within the field.

The literature review focuses on the following research question:

How can the relationship between ICT and innovation in services be defined and conceptualized according to existing literature?

This study adopts a structured approach towards the definition of concepts and constructs, which characterize the different facets of the relationship between ICT and innovation in services. The aim of the literature review is to support – and thereby contribute to – the future development of the literature by classifying the body of knowledge in the field and outlining a conceptual typology that synthesizes the relationship between ICT and innovation in services. In fact, thorough literature reviews can strengthen the academic relevance of the fields of study they address, as well as support their growth and progress (Webster & Watson, 2002). In addition, there are two main phenomena, which make the research question relevant. Firstly, the emergence of the Service-Dominant Logic (Vargo & Lusch, 2004, 2007) and the diffusion of servitization (Baines, Lightfoot, Benedettini, & Kay, 2009). Secondly, the rapid digitalization of both goods and services due to technological and market developments (Scupola, Henten, & Nicolajsen, 2009; Targowski, 2009). The results from the analysis and specifically the conceptual typology answer the research question and clarify the different perspectives, from which the relationship between ICT and innovation in services can be looked at.

The paper is organized as follows. The introduction presents an overview of the research area and highlights the research question. The second section is dedicated to the definition of ICT and innovation in services. It delineates the field of interest of the study, by outlining the key concepts and variables of the following analysis. Moreover, it sets the scope and boundaries of the study. In the fourth section the methodology that was applied for the literature review is described. The main section of the paper is the analysis of findings from the literature search with the subsequent discussion, within which the conceptual typology is presented. Finally, the conclusions answer explicitly the research question; highlight the gaps in the existing literature along with the opportunities for future research.

Setting the grounds: Information and Communication Technologies, services and innovation

Information and Communication Technologies: definitions and roles

Without stating an explicit definition of ICT, several studies focus on the economic impact of ICT and distinguish between their role as product or within organizational processes (OECD, 2004, 2011; Schreyer, 1999). OECD countries agreed on the industry-based definition of the ICT sector, which includes that: (a) for manufacturing industries, the products must fulfil the function of information processing and communication or must use electronic processing to detect, measure and/or record physical phenomena or control a physical process; (b) for service industries, the

products must enable the function of information processing and communication by electronic means (OECD, 2004). Among the available definitions of ICT, this study adopts such broad definition of ICT manufacturing and service industries, which includes the more specific classifications according to context dependent aspects. Behind this choice is the willingness to outline the different perspectives on ICT, as well as on innovation in services, to better represent the multi-faceted relationship between these two constructs. The definition by Schreyer (1999) allows including all types of digital offerings in the analysis by distinguishing their role with regards to innovation in services.

Schreyer (1999) highlights two main differences in the way OECD researchers treat ICT: (a) the difference between ICT industries and their contribution to growth, and the role of ICT as capital inputs in all parts of the economy; (b) the difference between ICT effects on labour and on multifactor productivity. From this distinction he derives three aspects of the impact of ICT on economic growth: (1) ICT production; (2) ICT as a capital input; (3) ICT as a special capital input (Schreyer, 1999). In the first case, scholars consider ICT as a product, and look at ICT relevance in terms of the role of ICT products in the GDP of the economy. The second and third aspects, on the other hand, emphasize the role of ICT by measuring their contribution on productivity growth of the organizations. When looking at ICT as a capital input, researchers consider their direct and observable impact on outcome and on labour productivity growth, but do not observe side effects, i.e. spill over effects and externalities. ICT as capital inputs are one of the types of physical resources in which an organization chooses to invest, and that are combined with other capital (financial resources) and labour (human resources) to produce output (Grant, 2005). Their impact is thus measured in terms of Return On Investment (ROI) (Schreyer, 1999). However, several scholars argued and empirically proved the existence of spill over effects and externalities in ICT development and implementation within organizations (Bygstad & Lanestedt, 2009; Jong & Vermeulen, 2003; OECD, 2004; Targowski, 2009; Tether & Tajar, 2008). This makes it necessary to emphasize the nature of ICT as special capital input (Gago & Rubalcaba, 2006; Schreyer, 1999), which is also what I do in the analysis. Spill over effects are defined as those benefits, which go beyond those accruing to owners and investors. Such externalities are harder to measure, but improve overall productivity and aggregate incoming growth (Schreyer, 1999). The concept of ICT as a special capital input is based on the claim that ICT produce benefits that go beyond those occurring to investors and owners, i.e. ROI.

Innovation in services

As opposed to the recent research on innovation in services, the traditional innovation literature has not recognized the differentiation between tangible good and services. Nevertheless, even in the service innovation literature, the full diversity of services and the complexity of their inner attributes make it difficult to determine a single definition of service providing (Cook, Goh, &

Chung, 1999). In addition, researchers and practitioners do not share the same understanding on the definition of innovation within the service context (Forsman & Rantanen, 2011). Rather than proposing a comprehensive definition, the best way to clarify the nature of services, given the aim and the scope of this work, seems to be looking at their distinguishing characteristics as compared to tangible goods. Although the differentiation is much more blurred in the actual practice than in theory, services tend to involve customer participation in the service process and to be: (a) simultaneously produced and consumed; (b) perishable; (c) intangible; and (d) heterogeneous (Fitzsimmons & Fitzsimmons, 2006). Each service is characterized by a unique combination of these attributes and relative degrees (Fitzsimmons & Fitzsimmons, 2006; Jong, Bruins, Dolfsma, & Meijaard, 2003). Digital offerings are included in this study as services when fully reflecting this definition.

Not only services are achieving increasing importance at the eyes of the researchers, but also it has become clear that a large share of innovative effort in contemporary economies relates to service innovation and to New Service Development (NSD) (Jong et al., 2003; Jong & Vermeulen, 2003). A service innovation can be defined as an idea for a new service, or for the renewal of an existing service, which is developed and carried into practice to offer added value to the customer and provide benefit to the provider. To be an innovation, the renewal must impact not only on the developer but involve elements that allow reproduction in different contexts (Sundbo, 1997). Although the traditional innovation literature has distinguished between product and process innovation, such characterization have been proven hard to apply to services, where the final product is usually assimilated by the process (Forsman & Rantanen, 2011; Forsman, 2011; Gallouj & Weinstein, 1997; Hertog, Gallouj, & Segers, 2011). More specifically, according to Den Hertog (2000), four main dimensions describe a new service: (1) new service concept; (2) new client interface; (3) new service delivery system; (4) technological options. Any service innovation involves a certain blend of these dimensions (den Hertog, 2000).

Once the differentiation between product and process innovation was identified, scholars recognized the importance of technology and organizational innovation (Atilgan-Inan et al., 2010; Fagerberg, Mowery, & Nelson, 2006). Building on Schumpeterian theories on innovation, Barras (1986) provides the foundation for the theory of innovation in services by actually starting with the analysis of the process of adoption of new technologies within a traditional NPD model. He argues that in the service industry the innovation process is actually originated by the adoption of the new technology itself, which subsequently drives to service innovation (Barras, 1986). More recently, Jong et al. (2003) show that technology especially impacts on service innovation in the process of service delivery. Furthermore they demonstrated how correct adoption and use of Information Technologies (IT) not only can increase efficiency, but also have a positive impact on innovation in services (Jong et al., 2003). IT, in fact, is shown to: (a) facilitate idea generation for

new and/or improved services; (b) accelerate the development of the time-to-market of new services; and (c) ease interactions within and between stakeholders (Jong et al., 2003; Popoli & Popoli, 2009; Targowski, 2009). Technology innovation is thus defined here as an innovation in the technology that supports a service process in one or more of its phases.

Following the traditional innovation literature, organizational innovation is here defined as the implementation of a process of change within an organization, which is able to develop and transform its social system without damaging the existing organizational systems (Fuglsang & Sundbo, 2005; Kimberly & Evanisko, 1981; Nicolau & Santa-María, 2013b).

Finally, Chesbrough and Rosenbloom (2002) outline the importance, in modern economies, of business model innovation. In a way, business model innovation extends the construct of marketing innovation as it interests the perception of the innovation not only by customers, but also other stakeholders, e.g.,suppliers and partners. Marketing innovation, in fact, has been defined as the implementation of a new marketing method aimed at better addressing customer needs, opening up new markets, or newly positioning a firm's product on the market, with the objective of increasing the firm's sales (Nicolau & Santa-María, 2013b). On the other hand, business models touch upon various, cross-sectional aspects of an organization, as well as reflect the positioning within the market and the modes of interaction with external stakeholders (Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Sanchez & Ricart, 2010). Following Amit and Zott (2012), it is thus possible to define business model innovation as the creation of (a) a new market or (b) new opportunities in existing markets and exploitation thereof. Business model innovation is a potential source of competitive advantage, which can yield the innovator to important benefits even without the disruption of an industry.

Setting the boundaries

It is evident that a significant and heterogeneous body of knowledge is available on ICT, services and innovation. This literature review covers the different aspects of the relationship between ICT and innovation in services. To guide the extraction and discussion of the findings I derived two main concepts, which constitute the foundation of the knowledge on ICT and innovation in services and the ground of my analysis: (1) type of ICT involvement; (2) type of innovation. The first concept – type of ICT involvement – includes the role of ICT as a product and as a special capital input (adapted from Schreyer, 1999). The latter is in turn differentiated into ICT impact as an enabler, facilitating structure or utility for innovation (Broadbent, Weill, & Neo, 1999; Mele, Spena, & Colurcio, 2010).

In fact, the role of ICT within innovation in services can be classified as: (1) enabler, as innovation in services often derives from the introduction of a new technology or from the different use of an existing one, i.e. banking and e-government services (Barras, 1986); (2)

support infrastructure, when the technology lowers the effort required for implementing an innovation, i.e. online help desk for the employees during a change process – whether of a service, a process or the whole business model; (3) utility, when ICT adoption and use aim at reducing costs while increasing coordination of inter- and intra-organizational activities (Broadbent et al., 1999; Mele et al., 2010; Scupola, 2014). In the latter case, the development and implementation of ICT facilitates and improves business processes intended to produce innovation, as in the case of webinars.

The dedicated literature also helped identifying the different types of innovation: (a) innovation in the service offering – new service (den Hertog, 2000; Jong et al., 2003; Jong & Vermeulen, 2003; Sundbo, 1997; Toivonen & Tuominen, 2009) and new delivery (den Hertog, 2000); (b) technology innovation (Barras, 1986; Fagerberg et al., 2006; Jong et al., 2003); (c) organizational innovation (Atilgan-Inan et al., 2010; Fagerberg et al., 2006; Fuglsang & Sundbo, 2005; Kimberly & Evanisko, 1981); and (d) business model innovation (Amit & Zott, 2001, 2012; Chesbrough & Rosenbloom, 2002; Sanchez & Ricart, 2010). Table 1 summarizes and visualizes the preliminary literature review into these two main concepts and the derived variables, with reference to the authoring scholars. This table also represents the analysis scheme, which guided the examination.

Table 1: The analysis scheme - Concepts, variables, and authors.

Concept	Variable		Author(-s)
Type of ICT involvement	Product		OECD, 2004; Schreyer, 1999
	Process	Enabler	Broadbent et al., 1999; Mele et al, 2010; Scupola, 2014.
		Support	
		Utility	
Type of innovation	Innovation in the offering	New service	Den Hertog, 2000; Jong & Vermeulen, 2003; Jong et al., 2003; Toivonen & Tuominen, 2009; Sundbo, 1997
		New delivery	den Hertog, 2000
	Technology innovation		Barras, 1986; Jong et al., 2003; Fagerberg et al., 2006
	Organizational innovation		Fagerberg et al., 2006; Atilgan-Inan et al., 2010; Fuglsang & Sundbo, 2005; Kimberly & Evanisko, 1981
	Business model innovation		Amit & Zott, 2001; Chesbrough & Rosenbloom, 2002; Sanchez & Ricart, 2010; Amit & Zott, 2012

Please notice that the table reports the distinction between type of ICT involvement by referring to involvement in the (a) product; (b) process. The latter includes the concept of ICT as a special capital input (Schreyer, 1999), which I adapted to the scope of my analysis. In fact, the variable ICT as a special capital input synthesizes the directly measurable impact of ICT on organizational processes, i.e., what Schreyer (1999) defines as ICT as a capital input, but also spill over effects

and externalities, i.e., ICT as a special capital input, with emphasis on those that make ICT enabler, support and utility for innovation (Broadbent et al., 1999; Mele et al., 2010; Scupola, 2014).

Research methodology

Four steps compose the research methodology for this literature review: (1) identification of the research area and of the research question; (2) definition of the key variables and setting of the boundaries; (3) search and identification of the relevant literature; and (4) analysis of the collected literature and discussion of findings. "A coherent literature review emerges only from a coherent conceptual structuring of the topic itself" (Bem, 1995, p.175 as in Webster and Watson, 2002, p.xiv), especially when the aim is to create a firm foundation for advancing knowledge. Webster and Watson (2002) describe the two main types of reviews, centred on: (a) a significant existing body of knowledge in the research area, whose review results in a conceptual model that synthesizes and extends existing literature; (2) an emerging issue, whose review offers fresh theoretical foundations through a conceptual model (Webster & Watson, 2002). A thorough literature review on the relationship between ICT and innovation in services is still missing despite the availability of a consistent body of knowledge on the topic. It is therefore possible to recognize the review presented in this paper as of the first type, which specifically aims at offering a coherent structure to the research area. Each step of the research methodology calls for dedicated research methods and strategies, which are described in the following paragraphs.

Identification of the research area and of the research question

First a literature search on ICT, services and innovation separately was conducted, whose results allowed identifying the research area, the research question, and the scope of the study. The term ICT was preferred to Information Technology (IT) to include in the analysis the management and the diffusion of information through media-broadcasting technologies, which are usually not included in the definitions of IT from the IS literature.

Definition of the key variables and setting of the boundaries

Following Webster & Watson's guidelines (2002), a concept-centric approach was adopted. Once gained an overview of the research area through the preliminary literature review, it was possible to identify the two main concepts, which have a central role in determining the relationship between ICT and innovation in services: (1) type of ICT involvement; (2) type of innovation. The key variables were then derived and the analysis scheme developed (Table 1). Finally, the concepts and variables from the analysis scheme were used to determine the organizing framework of the concept matrix and, consequently, of the literature review (Webster & Watson, 2002). The concept matrix (Appendix A, Table A.1), which was filled in after having completed

the search and identification of the relevant knowledge on ICT and innovation in services, synthesizes the literature through a discussion of concepts and variables within each examined article.

Search and identification of the relevant literature

To collect and identify the relevant literature to answer the research question, (a) a literature search strategy; (b) selection criteria for the studies to be included in the analysis; and (c) an analysis scheme outlining the documentation and coding of the collected body of knowledge were used (Leidner & Kayworth, 2006). For the literature search strategy inspiration was taken from Webster and Watson (2002), and a structured approach based on a search by topic, instead of by journal, was adopted. To make sure to include all major contributions, which are likely to be found in major journals, ABI Inform was selected as main data source. Moreover, Scopus and ISI Web of Knowledge were searched to include relevant conference proceedings and make sure the literature review is up-to-date.

Both the research question and the scope of the literature review were considered to outline the selection criteria. The inquiry was limited to those studies that reported "ICT", "servic*" and "innovat*" among the keywords, and the combination of these three terms was searched for in all databases. Appendix B reports a detailed description of criteria and results from the literature search. The results were narrowed to those articles, which had a focus on one or more of the defined keywords, by using the available search tools. More specifically, the tool "subject" was used on ABI Inform; "subjarea" on Scopus; and "category" on ISI Web of Knowledge. To collect the 131 abstracts that resulted from my search a database was created, from which those studies that clearly did not match with the scope of my study were excluded. A total amount of 86 articles was thus obtained after having read the 131 abstracts. The exclusion criterion for this second screening was whether the definition of ICT, service and innovation in the collected articles matched with the definition established for the study. The following step was the filling in of an overview table with the 86 articles, which aimed at summarizing the collected body of knowledge according to the analysis scheme (Table 1). The matrix for the overview table is reported in Appendix C, Table C.1. To outline the most researched areas a section dedicated to the technologies and sectors touched upon by each study was included in the overview table. Finally the articles were classified according to the levels of analysis they adopted: (a) micro level, meaning individuals and sub-units of organizations, such as teams, departments and divisions; (b) meso level, meaning organizations considered as a whole; (c) macro level, meaning systemic entities, such as sectors, industries and networks, along with local, national and global organisms (Leidner & Kayworth, 2006).

Analysis of the collected literature and discussion of findings

The analysis of the collected literature began by deriving concepts and variables from the preliminary literature review to build the concept matrix (Appendix A, Table A.1) as prescribed by Webster and Watson (2002). The transformation of the overview table into the concept matrix allowed spotting 45 out of 86 articles in the database that either did not fit the scope of the study, which were thus excluded from the analysis. The exclusion criteria for this last screening was, as in the previous one, whether the definition of ICT, service and innovation in the collected articles matched with the definition established for this study. Moreover, those conference papers, whose full text was not available online, were left out. This last exclusion was carried out to ensure that only articles with available full text were included in the analysis, to strengthen the validity of results. Appendix A, Table A.1 reports the concept matrix with the 41 papers that were finally included in the analysis.

An excellent start for building the concept matrix has been provided by the approach for understanding ICT by Schreyer (1999). Schreyer (1999) shows the three aspects of the impact of ICT on economic growth according to OECD researchers: (1) ICT production; (2) ICT as a capital input; (3) ICT as a special capital input. Right from the beginning of the analysis it was noticed that (a) many scholars demonstrated the existence of spill over effects and externalities in ICT contributions to productivity growth (Bygstad & Lanestedt, 2009; Jong et al., 2003; OECD, 2004; Tether & Tajar, 2008); and (b) the studies that resulted from the literature search, when looking at ICT impact on productivity growth of organizations, all took into consideration these spill over effects and externalities. Therefore the collected body of knowledge was divided according to whether they emphasized the aspect of ICT as (1) product or (2) special capital input with regards to innovation.

The relationship between and among concepts and variables found in the existing literature on ICT and innovation in services was then investigated to: (a) define and conceptualize the relationship between ICT and innovation in services; (b) identify umbrella themes to organize the body of knowledge and outline research gaps. The concept matrix provided an overview of the concepts and variables discussed in each article, which facilitated the clustering into themes. The clustering involved a series of subsequent steps. The body of knowledge was divided according to the adaptation of Schreyer's classification (1999) and a detailed analysis of the articles carried out. The focus on how the studies treated each variable of the analysis scheme allowed recognizing similarities, dissimilarities and overlapping areas. Through a detailed examination of identified similarities, dissimilarities and overlapping areas the studies were grouped into sub-themes and finally into umbrella themes. The five umbrella themes that emerged from the analysis of the literature are: (1) management of ICT-based technological innovation; (2)

management of organizational innovation resulting from ICT adoption; (3) NSD and innovation in service delivery; (4) business model innovation; and (5) relationship between ICT and innovation in services.

Analysis of findings: the five umbrella themes

Through the analysis of 41 studies that were finally included in the study the relationships between and among variables and concepts were spotted within the existing literature on ICT and innovation in services and five umbrella themes were identified. The collected papers, in fact, were analysed and categorized through the concept-based analysis scheme derived from existing literature. Table 2 shows the umbrella themes along with the corresponding authors. The themes are ordered according to the variables in the concept matrix (Appendix A, Table A.1), and are presented in detail in the following paragraphs.

Table 2: Table of themes with corresponding authors.

	Theme	Level of analysis	ICT as product	ICT as special capital input	ICT as product and as special capital input
1	Management of ICT-based technological innovations in services	Micro	Campos et al., 2007; Cocosila and Archer, 2010; Gilbert and Han, 2005; Norum et al., 2003; Ram et al., 2011; Wirth et al., 2008		S. Lee et al., 2011; Nylén and Holmström, 2011; Kanstrup et al., 2010
		Meso	Constantinides, 2006; Drozdová, 2008; Jetter et al., 2008; Mangan and Kelly, 2009		Bygstad, 2010; Bygstad and Aanby, 2010; Lyytinen and Rose, 2003
		Macro	Chen and Watanabe, 2006; Chen et al., 2007; Shareef et al., 2011	Castellacci, 2010	Ayres and Williams, 2004; S. Lee et al., 2009; Potts and Mandeville, 2007
2	Management of organizational innovation in ICT-based services	Micro	Beynon-Davies, 2005		
		Meso	Arduini et al., 2010		
		Macro	Paskaleva-Shapira et al., 2008		
3	Business model innovation in services	Micro			
		Meso			Drozdová, 2008; Jetter et al., 2008; Yovanof and Hazapis, 2008
		Macro			
4	NSD and innovation in service delivery	Micro			
		Meso	Bygstad and Lanestedt. 2009; Leon and Davies, 2008; Moller et al., 2008		
		Macro	Paskaleva-Shapira et al., 2008; Ritala et al., 2009; Siddiquee, 2008; Tuunainen and Tuunanen, 2011		
5	Relationship between ICT and innovation in services	Micro			
		Meso		Gago and Rubalcaba, 2006; Gambarotto and Cammozzo, 2010; Hidalgo Nuchera et al., 2008; Jbilou, et al. 2008	
		Macro	Bauer, 2010; R. Williams et al., 2011	Hempell, 2005	

Theme 1: Management of ICT-based technological innovations in services

The majority of studies included in the analysis look at the impact of ICT-based technological innovation on different types of service providing organizations. The focus on ICT as a product predominates within this theme. The innovation is the ICT itself, whose adoption and implementation processes generate various consequences in the organization. The studies collected under Theme 1 share the interest for understanding these consequences and the related reactions. In some cases, scholars consider also ICT-based technological innovations' role as special capital input, and study their impact on the innovation processes of the organization. The studies take into consideration many different technologies and focus on various service sectors.

The first sub-set of studies within theme 1 aims at understanding the reasons for adoption of ICT-based technological innovation within services. The analyses show that (a) awareness of the technology and its functionalities (Ram, Anbu, & Kataria, 2011); (b) acceptance and appreciation of the technological innovation (Cocosila & Archer, 2010); and (c) availability of extra-services motivate potential users to adopt the technological innovation (Norum, Grev, Moen, Balteskard, & Holthe, 2003). Conversely, the perception of financial, psychological and privacy risk acts as a repellent for adoption. Service providers should therefore create trust among their potential target to ease adoption of ICT-based technological innovations (Cocosila & Archer, 2010; Shareef, Kumar, Kumar, & Dwivedi, 2011).

Going on in the adoption process, some scholars concentrate on the management of organizational consequences of ICT-based technological innovations within services, such as the networks of interdependencies and strategies of negotiation between institutional arrangements, people, technological developments and work practices (Constantinides, 2006). Organizations should also ensure user satisfaction (Campos, Jantunen, & Prakash, 2007) and adapt to the specific circumstances and target users (Mangan & Kelly, 2009), which means flexibility and innovativeness. To ease the process of organizational change originated by the adoption of an ICT-based innovation within ICT-based service sectors, (Wirth, von Pape, & Karnowski, 2008) and (Gilbert & Han, 2005) suggest considering the different patterns of adoption of ICT-based technological innovations among users. Two studies reveal the need to implement changes in the business model as a result of ICT-based technological innovation (Drozdová, 2008; Jetter, Satzger, & Neus, 2008).

Finally, a sub-set of studies demonstrates the existence of a self-reinforcing innovation mechanism, which seems to be an inner feature of ICT-based technological innovation in different situations and circumstances. Scholars observe this mechanism both when considering ICT only as a product (Chen, Watanabe, & Griffy-Brown, 2007; Chen & Watanabe, 2006) or as special capital input (Castellacci, 2010), and when recognizing also their role as special capital

input (Ayres & Williams, 2004; Bygstad & Aanby, 2010; Bygstad, 2010; Kanstrup, Bjerge, & Kristensen, 2010; S. Lee, Kim, & Park, 2009; S.-G. Lee, Trimi, Byun, & Kang, 2011; Lyytinen & Rose, 2003; Nylén & Holmström, 2011; Potts & Mandeville, 2007; Sharif, 2010).

Theme 2: Management of organizational innovation resulting from ICT adoption

The second theme includes those works that focus on the management of the organizational innovation, when needed because of ICT adoption. Here the emphasis is not on the technology itself, but on the impact the technology has on organizational innovation within services. Theme 2 in fact collects three studies that, while looking on the adoption of ICT to provide e-Government services, emphasize the organizational innovation rather than the technological innovation. Although sector specific, the findings can be applied to other ICT-based services with the relative adaptations.

In particular, within this theme scholars highlight some strategic solutions that might support organizational innovation, such as customer orientation and integration of front-end and back-end systems (Beynon-Davies, 2005), along with cooperative participation of all stakeholders (Paskaleva-Shapira, Azorín, & Chiabai, 2008). Moreover, they recall what already said about technological innovation: different types of organizations in different settings require a different set of support tools (Arduini, Belotti, Denni, Giungato, & Zanfei, 2010).

Theme 3: Business model innovation in services

Theme 3 includes the few works that pay attention to business model innovation. Here scholars adopt a meso level of analysis and the focus is on both ICT as product and as capital input. Drozdová (2008) and Jetter et al. (2008) study the impact of ICT-based technology innovation on service providers, and postulate the consequent need for business model innovation. Drozdová (2008) argues for the strong interconnection between the business model and the IS, which makes it necessary to adapt the business model according to ICT-based innovation (Drozdová, 2008). Similarly, Jetter et al. (2008) recommend constantly monitoring improvements in the technology and being ready for innovating the business model according to the dynamics of the market (Jetter et al., 2008). The findings of Yovanof and Hazapis (2008) go in the same direction as they present the concept of business model innovation as a tool for taking advantage of disruptive technologies. They argue that ICT convergence is the cause of a paradigm shift with innovation effects that are both effective and disruptive. In turn, this calls for equally disruptive business models that reshape the innovation strategy (Yovanof & Hazapis, 2008).

Research on business model innovation is still developing (e.g., Chesbrough, 2010; Osterwalder, 2004), and this is reflected in the fact that only three papers on the relationship between business model innovation and ICT in services emerged from the literature search. It can thus not be argued that the elements outlined here represent the whole picture on this topic.

Nonetheless, the three papers on business model innovation and ICT in services are clearly distinguishable from the other studies included in this work, which made the specific theme emerge from the analysis. Not only do these articles outline the increasing interest on business model innovation in services in relation to ICT, but they also offer a first ground on which to build on to further investigate the nature of such relationship.

Among the causes of the need for organizations to implement business model innovation due to ICT-based technological innovation the analysed works outline: (1) the more sophisticated and challenging user demand (Jetter et al., 2008; Yovanof & Hazapis, 2008); (2) the increased global competition (Yovanof & Hazapis, 2008); and (3) the advances and disruptions in ICT (Drozdová, 2008; Jetter et al., 2008; Yovanof & Hazapis, 2008). Regarding the management of business model innovation, the studies outline some of the elements that service providers should take into consideration when adapting their business model to ICT-based technological changes and innovations, such as (i) the interconnection between the business model and the IS infrastructure (Drozdová, 2008; Jetter et al., 2008; Yovanof & Hazapis, 2008); (ii) the differences between organizations and circumstances (Drozdová, 2008); (iii) the need to integrate structural and infrastructural tasks of the business model (Drozdová, 2008; Jetter et al., 2008; Yovanof & Hazapis, 2008); (iv) the need to be flexible and adapt to the changes of dynamic markets (Jetter et al., 2008; Yovanof & Hazapis, 2008).

Theme 4: ICT in NSD and innovation in service delivery

Theme 4 – ICT in NSD and innovation in service delivery – includes the studies, whose emphasis is on innovation in the offering, both in terms of NSD an service delivery innovation, within ICT-based services. Again, the focus is on ICT as a product. This theme outlines (1) how to manage ICT-based NSD and service delivery innovation process and (2) the critical factors of success of service offering and service delivery innovation.

The management of service offering and service delivery innovation processes results very similar to the management of organizational innovation. First, the integration of all the front-end and back-end activities related to ICT-based NSD and service delivery innovation processes (Leon & Davies, 2008; Tuunainen, Tuunanen, & Piispanen, 2011), recalls Beynon-Davies (2005), who postulated the same with regard to organizational innovation. In the latter case integration is necessary to ensure – among users belonging to the service providing organization – the understanding and usability of the system that is at the basis of the organizational innovation. Similarly, within NSD and service delivery innovation such integration supports (a) ease-of-use and (b) motivation to adopt for the final customers (Leon & Davies, 2008; Tuunainen et al., 2011). Second, the issue of cooperation between stakeholders emerges again, this time both as integrated element of the management of ICT-based innovation processes (Paskaleva-Shapira et

al., 2008; Ritala, Hurmelinna-Laukkanen, & Blomqvist, 2009; Tuunainen et al., 2011) and as critical factor of success for new services and/or service delivery innovation, both within business-to-customer (Bygstad & Lanestedt, 2009; Moller, Rajala, & Westerlund, 2008; Siddiquee, 2008) and business-to-business interactions (Ritala et al., 2009; Tuunainen et al., 2011).

The other critical factors of success for NSD and service delivery innovation are (1) a comprehensive, well-functioning and easy-to-use infrastructure (Leon & Davies, 2008; Siddiquee, 2008; Tuunainen et al., 2011); (2) awareness of the new service and/or service delivery, and motivation to switch to it (Siddiquee, 2008; Tuunainen et al., 2011); (3) sufficient ICT skills among the potential target (-s) of the innovation (Siddiquee, 2008).

Theme 5: The relationship between ICT and innovation in services

Theme 5 includes seven articles, which more generally aim at understanding the relationship between ICT and innovation in services from various angles. Most works look at ICT as a special capital input, and investigate their impact on innovation in services from various perspectives. Nevertheless, there are two studies that look at ICT-based service sectors to reveal which conditions favour innovation. The set of articles within theme 5 addresses (1) the factors that influence the relationship between ICT and innovation in services; (2) the impact of ICT as a special capital input on innovation in services.

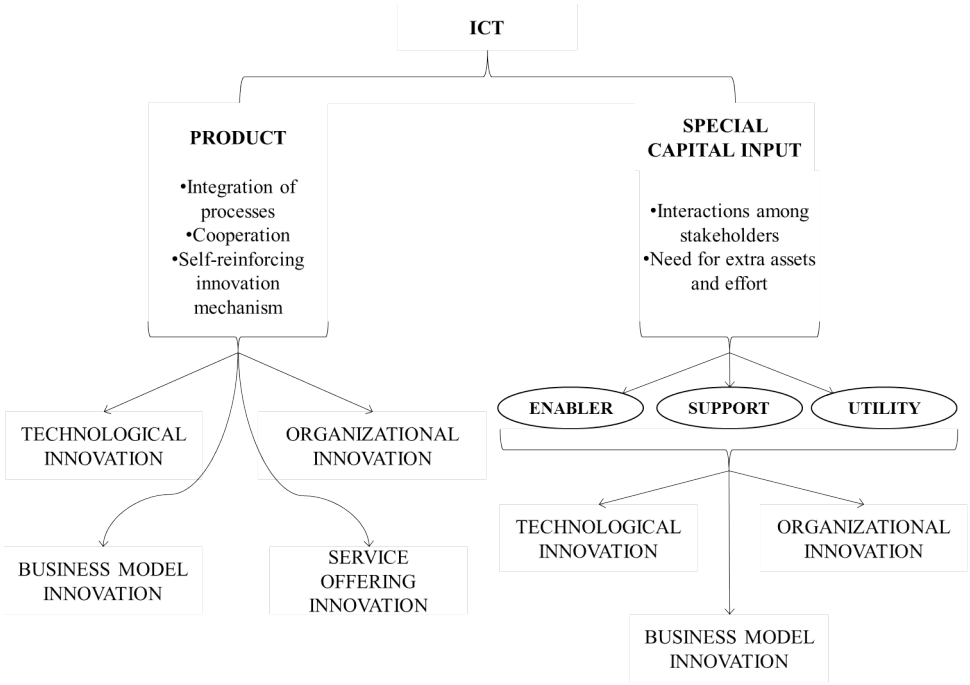
Among the factors that influence the relationship between ICT and innovation in services, Bauer (2010) and R. Williams et al. (2011) highlight the importance for centralized institutions to develop formalized standards and regulations as support for the innovativeness of ICT-based service sectors (Bauer, 2010; Williams et al., 2011). When looking at ICT as a special capital input, scholars recognize their sustaining role with regards to innovation in services. As a consequence of the co-producing nature of services, the studies recognize the importance of both B2B and B2C interactions among stakeholders (Gago & Rubalcaba, 2006; Hidalgo Nuchera & López Rodríguez, 2008). The enhanced market competition that is an inner characteristic of modern economies results also a driver of the positive influence of ICT towards innovation in services. On the other hand, ICT as a special capital input seems to lack the self-reinforcing mechanism that scholars postulated when referring to ICT both as a product and as a capital input within theme 1 (Ayres & Williams, 2004; Bygstad & Aanby, 2010; Bygstad, 2010; Chen et al., 2007; Chen & Watanabe, 2006; S. Lee et al., 2009; S.-G. Lee et al., 2011; Lyytinen & Rose, 2003). Organizations have to invest complementary assets and innovative efforts to benefit from ICT as a special capital input with regards to innovation in services (Gambarotto & Cammozzo, 2010; Hempell, 2005; Hidalgo Nuchera & López Rodríguez, 2008). Especially important is innovative experience: service providers with long-term innovation strategy result more likely to

benefit from the impact of ICT as special capital input on innovation (Hempell, 2005). Employee silence harnesses the potential benefits of ICT, as it contrasts knowledge sharing and collaborative value creation (Gambarotto & Cammozzo, 2010). An important element for organizations to take into consideration is also the diversification of cases and circumstances, which require the adaptation of strategies, management and policies related to ICT and innovation in services (Bauer, 2010; Gambarotto & Cammozzo, 2010; Jbilou, Landry, Amara, & El Adlouni, 2008; Williams et al., 2011). For what concerns the impact of ICT as a special capital input on innovation in services, scholars consider three types of innovation: (1) organizational innovation (Gago & Rubalcaba, 2006), with a special eye on outsourcing decision making processes (Williams et al., 2011); (2) business model innovation (Gago & Rubalcaba, 2006); (3) innovation in the service offering, both in terms of new services and new service delivery (Gago & Rubalcaba, 2006; Hempell, 2005).

The conceptual typology and the innovation cycles

The five umbrella themes allow capturing different perspectives on the relationship between ICT and innovation in services into the conceptual typology visualized in Figure 1.

Figure 1: The conceptual typology.



The issues touched upon within the themes overlap to a certain extent. While this overlap could be considered as a weakness of the proposed analysis, it allows both organizing existing literature and delineating three main process aspects of the relationship between ICT and innovation in services: (1) the integration of organizational and innovation process; (2) the cooperation among internal and external agents; (3) the self-reinforcing mechanism that characterizes ICT as a

product. The first two aspects make it necessary for the organization to invest additional innovation effort and complementary capital inputs to obtain a positive outcome from the interaction of ICT with innovation in services, due to the special capital input nature of ICT. The third, on the other hand, shows that technology innovation has a direct and immediate positive effect of stimulating the development of the other types of innovation, which strengthen existing research on the ability of ICT-based technology innovation to support interactions with external actors and, more specifically, customized and user-driven service innovation (e.g., Scupola, 2014; Sigala, 2010).

From the definition of ICT as both product and special capital input we know that ICT impact on the organization that implements them. The analysis of the literature on the relationship between ICT and innovation in services shows that such impact of ICT on innovation in services varies according to their involvement as product or as special capital input. When ICT is involved as a product, i.e. in form of technological innovation, it carries a self-reinforcing innovation mechanism (Ayres & Williams, 2004; Bygstad & Aanby, 2010; Bygstad, 2010; Chen et al., 2007; Chen & Watanabe, 2006; Gago & Rubalcaba, 2006; Hempell, 2005; Hidalgo Nuchera & López Rodríguez, 2008; S. Lee et al., 2009; S.-G. Lee et al., 2011). Such mechanism generates a positive effect for innovation in services without the need for additional effort by the organization. More specifically, it is possible to distinguish between the impact of the implementation of ICT-based technological innovation as (1) enabler and (2) utility for service innovation. In the first case, ICT seem to trigger technology innovation, due to (a) diffusion, substitution and competition mechanisms (Chen et al., 2007; Chen & Watanabe, 2006; Hempell, 2005; Hidalgo Nuchera & López Rodríguez, 2008; S.-G. Lee et al., 2011); and (b) generation of inputs for further technology innovation (Bygstad, 2010; S.-G. Lee et al., 2011).

Service innovation, similarly, is originated by the ground created by the technology innovation, which, at the same time, produces inputs to innovate the service and/or its delivery (Ayres & Williams, 2004). On the other hand, when the organization implements ICT as a utility for service innovation, they trigger (a) service innovation, by facilitating interactions among stakeholders (Gago & Rubalcaba, 2006; Hidalgo Nuchera & López Rodríguez, 2008), but also data collection and knowledge sharing (Bygstad & Aanby, 2010; Bygstad, 2010; S. Lee et al., 2009); and by creating network externalities (S.-G. Lee et al., 2011). As utility for service innovation, ICT also trigger (b) organizational innovation within the business units, because they allow connecting people and resources with more efficiency and efficacy (Bygstad & Aanby, 2010; S. Lee et al., 2009).

Due to their nature as special capital input, ICT impact on innovation in services also when they do not carry the self-reinforcing innovation mechanism. For example, as utility for organizational innovation, ICT influence the way innovation processes should be managed and

decided on, and thus require effort to positively affect innovation (Arduini et al., 2010; Beynon-Davies, 2005; Lyytinen & Rose, 2003; Paskaleva-Shapira et al., 2008). Similarly, ICT appear to produce externalities for the business model of the organization they are implemented within. Scholars show how business model innovation derives from the involvement of ICT only if the organization responds to (i) the interconnection between the business model and the IS infrastructure (Drozdová, 2008; Jetter et al., 2008; Yovanof & Hazapis, 2008); (ii) the differences between organizations and circumstances (Drozdová, 2008); (iii) the need to integrate structural and infrastructural tasks of the business model (Drozdová, 2008; Jetter et al., 2008); (iv) the need to be flexible and adapt to the changes of dynamic markets (Jetter et al., 2008; Yovanof & Hazapis, 2008).

Barras (1986) has outlined how related innovations have a combined effect, thus supporting each other's development. The three process aspects depicted above confirm and extend Barras' perspective on innovation cycles. While the existence of the cycles is confirmed, the analysis carried out in this study allows shedding light on the specific characteristics of the innovation cycles that are involved in the relationship between ICT and innovation in services. The innovation cycles turn out to be virtuous only for service and technology innovation. The self-reinforcing mechanism, in fact, seems to not apply for organizational and business model innovation, as confirmed by technology adoption studies. Existing literature on the effects of the implementation of technological innovation within organizations, in fact, stresses the need for supporting factors, e.g., communication, expertise capacity, top management support and so on, to not only ensure the successful implementation of a technology innovation, but also to allow for the organizational and business model innovation that is necessary to benefit from the technology itself (e.g., Bharosa, Janssen, & Bajnath, 2013; Daim, Brand, & Lin, 2011; Fernandes, 2013; Kurt, 2011; Targowski, 2009; Topacan, Basoglu, & Daim, 2010).

The self-reinforcing mechanism emerged as a crucial facet of the relationship between ICT and innovation in services, being implicitly described in many of the studies that resulted from the literature search, although not yet explicitly investigated. When ICT is implemented as enabler for service innovation, it carries the self-reinforcing innovation mechanism that creates virtuous cycles for service and technology innovation, which stimulates further service and technology innovation carrying the same mechanism. The impact of innovation on ICT is linked to (a) the stimulation of diffusion, substitution and competition mechanism that are involved in market dynamics and (b) the creation of inputs that feed further innovation of the ICT themselves, in form of technology or service innovation (Ayres & Williams, 2004; Bygstad & Aanby, 2010; Bygstad, 2010; Chen et al., 2007; Chen & Watanabe, 2006; S. Lee et al., 2009; S.-G. Lee et al., 2011).

Organizational innovation processes require the adaptation of the ICT systems that support them (Gambarotto & Cammozzo, 2010; Williams et al., 2011). The case by Williams et al. (2011) shows how organizational innovation can be used to foster ICT development as both product and special capital input. Similarly, Gambarotto and Cammozzo (2010) highlight that technology innovation is not enough to support the successful adoption and implementation of ICT, but that the latter needs to be complemented by organizational innovation as well. In both cases, the cycle is not automatically virtuous as with technology and service innovation. On the contrary, dedicated effort needs to be invested into those aspects of the organizational innovation that have an impact on the use of the technology, such as the division of labour and knowledge (Williams et al., 2011) and the links between decisional centres (Gambarotto & Cammozzo, 2010). The same applies to business model innovation: Drozdová (2008) highlights the interconnection between business model innovation and the IS of the organization. Similarly, Hempell (2005) suggests that, to achieve positive results in terms of innovation, ICT require long-term dedication and effort. It thus seems reasonable to assume that innovation in the business model impacts on the way ICT are adopted, implemented and innovated within the organization. Nevertheless, the investigation of the interactions between ICT and business model innovation is still limited, and the pre-conditions for and nature of such reciprocal impact are still unknown.

Discussion and Conclusion

The purpose of this literature review was to organize previous work on the relationship between ICT and innovation in services by identifying thematic areas and conceptualizing them in a typology, to advance knowledge in the field and support future research. The research question – How can the relationship between ICT and innovation in services be conceptualized and defined according to existing literature? – was answered by identifying five umbrella themes under which the collected articles were categorized. The outcome of the analysis is a conceptual typology that summarizes the multi-faceted relationship between ICT and innovation in services, and may therefore be used as a support to plan and execute future research on ICT and innovation in services.

Firstly, the typology outlines the three main aspects of the link between ICT as product and innovation in services that have been identified from the analysis: (1) the integration of organizational and innovation processes; (2) the cooperation among internal and external agents; and (3) the self-reinforcing innovation mechanism that characterizes ICT as a product. Secondly, as special capital input, ICT impact on technological, organizational and business model innovation, but lack the self-reinforcing mechanism. Nevertheless, ICT as a special capital input might enhance the interactions among stakeholders and facilitate open innovation models, such as the one postulated by Chesbrough (2003). In fact, ICT as a special capital input have been shown

to enable organizations to develop new skills and innovation by mean of a partner, but only when the cooperating parties create corresponding development plans, i.e., design win-win contracts (Bonacci & Tamburis, 2010; Popoli & Popoli, 2009). This might happen, for instance, in contexts of ICT services offshoring (Popoli & Popoli, 2009), or when ICT are involved in the achievement of innovation awards, which have been shown to reduce agency conflicts and increase trust among share- and stakeholders, such as customers and patrons (Nicolau & Santa-María, 2013a).

The analysis also allows to point out a few theoretical gaps, as it shows that the literature on the management of innovation for ICT-based technologies and services is widely developed, whereas issues such as organizational and business model innovation in services still need to be addressed in relation to ICT. Furthermore, the two areas, which appear as the most under-researched are: (1) business model innovation related to ICT within service sectors; and (2) open innovation and ICT in practice. In the first case, further analysis is needed to better understand how ICT can better sustain business model innovation within services. Similarly, scholars should investigate further on the role of ICT within open innovation in services, as existing knowledge on the topic still lacks validation and specificity.

The conceptual typology proposed here is a relevant contribution to the literature on innovation in services as it displays the diverse and reciprocal interactions between ICT-based technology innovation, other types of innovation and their different instances. While the typology is not exhaustive yet, as some theoretical gaps were found in the existing literature on which it is based, it does respond to Tether and Tajar's (2008) call for more light to be shed on the relationships between different types of innovation.

The implications of these results for researchers of innovation in services are centred on the need to differentiate between ICT as product and special capital input when dealing with the interaction of these technologies with innovation. From this analysis it can be underlined that the type of ICT involvement within innovation processes impacts on the outcome of the innovation itself. Therefore distinguishing between involvement of ICT as product and as special capital input might support scholars in isolating and studying in depth the different facets of the relationship between this type of technology and innovation in services. In addition, the two types of ICT involvement should be associated to different types of innovation, to understand potential interactions with their diverse costs and outcomes (Forsman, 2011; Nicolau & Santa-María, 2013b). This might facilitate the development and strengthening of the research in the area. The study also has implications for practitioners, who should never forget the need to invest additional innovative effort and complementary capital inputs to benefit from ICT spill over effects and externalities in terms of organizational and business model innovation. Failure to recognize this need might pull the organization into a vicious cycle with a negative impact on both ICT involvement and innovation.

To conclude, this study is not free of limitations. Whereas the systemic approached adopted here has supported a thorough and structured classification of the existing literature, it has limited the results from the literature review to those strictly related to the pre-established definitions of the concepts under investigation. Moreover, the conceptual typology is the result of the analysis of a fragmented body of knowledge and thus requires additional work to add details on the many facets of the relationship between ICT and innovation in services. For instance, the relationship between business model innovation in services and ICT is included in the conceptual typology despite being derived only from three papers. Additional research investigating such relationship is necessary to strengthen the understanding of this specific aspect, which represents a clear theoretical gap to be filled in by future research. This study also needs empirical investigation of the conceptual typology in the service industry to explore its correspondence with reality. Nonetheless, this paper provides a thorough literature review on the relationship between ICT and innovation in services, which allows outlining an agenda for future research. One of the main objectives of future research is the assessment of the causality of interactions between ICT and innovation in service, for example by developing a conceptual framework. Such framework should represent the causal links between and among the various elements of the relationship between ICT and innovation in services.

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Appendix A

Table A.1: The concept matrix.

	Author(s)	Year	Variables, concepts and sub-concepts												
			Level of analysis			ICT involvement				Type of innovation					
			Micro	Meso	Macro	Product	Process			Technology innovation	Business model innovation	Organizational innovation	Innovation in the offering		
			Sub-unit	Organization	Sector/Industry/Nation		ICT as enabler for innovation	ICT as support infrastructure for innovation	ICT as utility for innovation				Service delivery innovation	New Service Development	
1	Jbilou,J.; Landry,R.; Amara,N.; El Adlouni,S.	2009		X				X				X			
2	Bygstad,B.; Aanby,H.	2010		X		X	X	X	X	X		X	X		
3	Campos,J.; Jantunen,E.; Prakash,O.	2007	X			X				X			X	X	
4	Gago,D.; Rubalcaba,L.	2007		X			X	X	X	X	X	X	X	X	
5	Norum,J.; Grev,A.;Moen,M.; Balteskard,L.;Holthe,K.	2003	X			X							X		
6	Leon,N.; Davis,A.	2008		X		X							X	X	
7	Moller,K.; Rajala, R.; Westerlund,M.	2008		X		X								X	
8	Siddique,N.	2008			X	X							X		
9	Paskaleva-Shapira,K.; Azorin,J.; Chaibai,A.	2008			X	X						X		X	
10	Ram,S.; Anbu,J.P.; Kataria,S.	2011	X			X				X			X		
11	Constantinides,P.; Barrett,M.	2006		X		X				X		X			
12	Hempell,T.	2011			X		X	X	X	X		X			
13	Tuunainen,V.K.; Tuunanen,T.; Piispanen,J.	2011			X	X							X	X	
14	Nylén,D.; Holmström, J.	2011	X				X			X					
15	Ritala,P.; Hurmelinna-Laukkanen,P.; Blomqvist,K.	2009			X	X							X	X	
16	Potts,J.; Mandeville,T.	2007			X		X	X							

17	Chen,C.; Watanabe,C.; Griffybrown,C.	2007			X	X				X					
18	Ayres,R.U.; Williams,E.	2004			X	X	X			X					
19	Lee,S.G.; Trimi,S.; Byun,W.K.; Kang,M.	2011	X			X	X	X	X	X			X	X	
20	Williams,R.; Graham,I.; Jakobs,K.; Lyytinen,K.	2011			X	X	X	X	X			X			
21	Jimenez-Zarco,A.I.; Martinez-Ruiz,M.P.; Izquirdo-Yusta,A.	2011	X				X	X						X	
22	Shareef,M.A.; Kumar,V.; Kumar,U.; Dwivedi,Y.K.;	2011			X	X				X		X	X		
23	Cocosila,M.; Archer,N.	2010	X			X				X			X		
24	Castellacci,F.	2010			X		X	X		X					
25	Gambarotto,F.; Cammozzo,A.	2010		X				X				X			
26	Arduini,D.; Belotti,F.; Denni,M.; Giungato,G.; Zanfei,A.	2010		X		X				X		X			
27	Bygstad,B.	2010		X		X	X							X	
28	Kanstrup,A.M.; Bjerge,K.; Kristensen,J.E.	2010	X			X		X		X					
29	Bauer,J.M.	2010			X	X	X		X	X		X			
30	Hidalgo,A.; Lopez,V.	2009		X			X	X	X						
31	Lee,S.; Kim,M.S.; Park,Y.	2009			X	X	X	X	X	X					
32	Bygstad,B.; Lanestedt,G.	2009		X		X								X	
33	Jetter,M.; Satzger,G.; Neus,A.	2009		X		X	X			X	X	X			
34	Mangan,A.; Kelly,S.	2009		X		X				X		X			
35	Yovanof,G.S.; Hazapis,G.N.	2008	X	X		X	X	X	X	X	X	X			
36	Wirth,W.; von Pape,T.; Karnowski,V.	2008	X			X				X					
37	Drozdova,M.	2008		X		X	X			X	X	X			
38	Chen,C.J.; Watanabe,C.	2006			X	X				X					
39	Gilbert,A.L.; Han,H.	2005			X		X	X						X	
40	Beynon-Davies,P.	2005	X			X						X			
41	Lyytinen,K.; Rose,G.M.	2003		X		X	X					X			

Appendix B

Literature search: ICT and innovation in services (30/11/2011)

1) ABI Inform – Review and research articles

- **1321** documents found for: (servic*) AND (innovat*) AND (ICT) AND LN(English)
- **80** documents found for: (servic*) AND SU(innovat*) AND (ICT) AND LN(English)
- **55** documents found for: SU(servic*) AND (innovat*) AND (ICT) AND LN(English)
- **18** documents found for: SU(servic*) AND SU(innovat*) AND (ICT) AND LN(English)
- No documents found for: SU(servic*) AND SU(innovat*) AND SU(ICT) AND LN(English)
- No documents found for: (servic*) AND SU(innovat*) AND SU(ICT) AND LN(English)

2) SCOPUS – Review and research articles

- **548** results found for: TITLE-ABS-KEY(innovat* AND servic* AND ict*)
- **489** results found for: TITLE-ABS-KEY(innovat* AND servic* AND ict*) AND SUBJAREA(mult OR ceng OR CHEM OR comp OR eart OR ener OR engi OR envi OR mate OR math OR phys OR mult OR arts OR busi OR deci OR econ OR psyc OR soci)
- **216** results found for: TITLE-ABS-KEY(innovat* AND servic* AND ict) AND SUBJAREA(mult OR arts OR busi OR deci OR econ OR psyc OR soci)
- **17** results found for: KEY(innovat* AND servic* AND ict) AND SUBJAREA(mult OR arts OR busi OR deci OR econ OR psyc OR soci)

3) ISI – Review and research articles

- **116** results for Topic=(servic*) AND Topic=(innovat*) AND Topic=(ICT) AND Language=(English)
- **59 results for** Topic=(servic*) AND Topic=(innovat*) AND Topic=(ICT) AND Language=(English)

Refined by: [excluding] Web of Science Categories=(GENETICS HEREDITY OR ENVIRONMENTAL SCIENCES OR HEALTH POLICY SERVICES OR MEDICAL INFORMATICS OR INDUSTRIAL RELATIONS LABOR OR METALLURGY METALLURGICAL ENGINEERING OR AGRICULTURE MULTIDISCIPLINARY OR NEUROSCIENCES OR NURSING OR PHYSIOLOGY OR PLANT SCIENCES OR AGRONOMY OR PSYCHIATRY OR PSYCHOLOGY CLINICAL OR BIODIVERSITY CONSERVATION OR PUBLIC ENVIRONMENTAL OCCUPATIONAL HEALTH OR

REHABILITATION OR ENERGY FUELS OR GEOGRAPHY OR ENGINEERING AEROSPACE OR HEALTH CARE SCIENCES SERVICES) AND [excluding] Web of Science Categories=(ENGINEERING INDUSTRIAL OR OPERATIONS RESEARCH MANAGEMENT SCIENCE OR AUTOMATION CONTROL SYSTEMS OR EDUCATION EDUCATIONAL RESEARCH OR BUSINESS FINANCE OR ENGINEERING ELECTRICAL ELECTRONIC OR COMPUTER SCIENCE ARTIFICIAL INTELLIGENCE OR PUBLIC ADMINISTRATION OR ENGINEERING MANUFACTURING OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR ENVIRONMENTAL STUDIES OR COMPUTER SCIENCE THEORY METHODS OR TRANSPORTATION SCIENCE TECHNOLOGY)

Appendix C

Table C.1: The matrix for the overview table.

Author	Year	Title	Journal	Level of analysis	Type of ICT involvement	Type of technology	Sector	Notes

PAPER 4

Nardelli, G.; Scupola, A. (2013). Involving users in complex service systems' innovation processes by means of ICT-based tools: The case of Facility Management Services. SIG SVC 2013 Workshop: Delivering and Managing Services in Systems of Service Systems, ICIS 2013, 15th December 2013, Milan, Italy.

INVOLVING USERS IN COMPLEX SERVICE SYSTEMS' INNOVATION PROCESSES BY MEANS OF ICT-BASED TOOLS: THE CASE OF FACILITY MANAGEMENT SERVICES

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Abstract

Whether service innovation processes are planned or happen ad hoc, the involvement of users is increasingly being recognized as potentially supporting successful innovation outcomes. Facilities Management (FM) services are complex business-to-business services, whose innovation process is complicated by heterogeneous needs and expectations of the diverse stakeholders. This makes it particularly interesting to study user involvement within the context of FM services.

This paper aims at contributing to the literature on user involvement in services by addressing the roles played by the different stakeholders in FM open service innovations and depicting some of the supporting tools for stakeholder interaction within the context of FM services. The research design included 23 interviews in 15 Danish companies, complemented with archival data to ensure triangulation. The data were analysed deductively based on literature on service innovation and costumer roles in new service development.

The results of the analysis indicate that the involvement of users varies not only depending on the offered services, but also on the specific relation between users and the service. This implies that heterogeneous needs and expectations have to be matched and balanced for service innovation to be successful, by using specific Information and Communication Technology (ICT)-based and face-to-face support tools to involve different stakeholders throughout innovation processes. These results contribute to the literature on open innovation and user involvement in services as they highlight the process to follow, and the tools to use, to increase user satisfaction in service innovation.

Keywords: business-to-business services; user involvement; open innovation; Information and Communication Technology

Introduction

The service sector is an important economic sector of our society, employing about 70 % of the work force in the most developed economies, and often characterized by complex service systems, e.g., the transportation system. Information and Communication Technologies (ICT), such as computer-mediated social networks, integrated billing and payment systems, and multi-modal transport systems are becoming an integral part of services and service systems, and are often intertwined with the service systems themselves. A type of complex service that has developed over the last twenty years is Facility Management (FM) services. FM services are here defined as a diverse set of support services, which aim at enabling organizations to pursue the objectives and goals of their core business (Alexander, 1992). Examples include building maintenance, catering, but also Information Technology (IT) services and cleaning. FM services, due to their supportive nature and to the fact that they are often outsourced to external providers, can be described as complex business-to-business service systems. They are in fact characterized by a complex value chain, which includes top management, internal FM unit and employees of the client organization, along with the outsourced providers.

Facility management services require radical and incremental innovation not only to succeed and compete in the hectic contemporary markets, but also to affirm their increasingly importance within organizations (Goyal & Pitt, 2007; Lindkvist & Elmualim, 2010; Mudrak, Wagenberg, & Wubben, 2005). However, the complex value chain of FM services makes it difficult for internal and external providers to manage innovation processes, as heterogeneous needs and expectations can create tensions among stakeholders when planning and implementing FM service innovations. At the same time, it also implies that diverse internal and external stakeholders get to be involved to various degrees throughout the FM service innovation process. This makes it particularly interesting to study processes of open innovation and, more specifically, user involvement in the innovation process of complex FM services. Service innovation literature, in fact, has highlighted how the proactive involvement of users in the innovation processes, if managed correctly, is able to support such development and implementation of ideas (Alam & Perry, 2002).

Given the complexity of FM services and the multiplicity of actors involved in such a service system, it might be expected that involving users in FM innovation processes is not easy. Furthermore, due to the pervasive importance of ICT in complex service systems, it might be expected that ICT might also be used in supporting FM service innovation processes. Therefore, the research question addressed in this paper is:

How can users be involved in the different stages of the open innovation processes of complex FM services by means of ICT-based tools?

To answer the research question, the paper draws on literature on new service development and service innovation; literature on customer roles in new product and service development; and literature on FM innovation to conduct an empirical investigation of user involvement in the FM service field. Data collected in several FM organizations were used to characterize such user involvement.

This paper contributes to the literature on service science and information systems by (1) investigating user involvement in service innovation processes of complex FM service systems and (2) depicting some of the ICT-based tools, which support stakeholder interaction in such a process. Research on open innovation has mainly focused on manufacturing and high tech industries, although recently has started to focus on services as differentiated from tangible products (Chesbrough, 2011; Scupola & Nicolajsen, 2010). Empirical evidence indicates that open innovation in services is not only feasible, but even easier to manage in services than in tangible goods, especially for inflows of knowledge and non-pecuniary exchanges (Aas & Pedersen, 2012). Nevertheless, investigations have focused on drivers and effects of open innovation (e.g., Suh & Kim, 2012), and mostly within the context of business-to-consumer services (e.g., Sjödin & Kristensson, 2012). Furthermore, despite the important role of ICT in complex service systems, previous literature has not yet highlighted the ICT tools that facilitate stakeholder interaction in open service innovation processes.

The paper is structured as follows. The introduction presents the background, and the research question of the study. The second section introduces the empirical setting of the study. The third section outlines the theoretical background, while the fourth presents the research method. This is followed by the analysis of findings. Finally, the last sections provide a discussion of results and the concluding remarks.

Empirical setting

Understanding FM services and FM innovation

In the last three decades, FM has established itself has a key service sector, with a diverse and highly competitive market of FM contractors, in-house teams, FM providers, FM consultants, and professional FM institutions (Cardellino & Finch, 2006) that form complex FM supply chains (Nutt, 2000) characterizing them as a complex service system. Coenen et al. (2012) states that the provision of one or more FM services is usually outsourced to one or more external FM providers. The outsourced FM providers collaborate with the internal FM unit of the client organization to ensure the proper functioning of the organization as a whole, by providing FM services to the employees, i.e. the end-users (Table 1).

Table 1: Stakeholders and stakeholder roles in the FM value chain.

Stakeholder	Role	Explanation
Organization, represented by the top management	Client	Orders to the internal FM unit the services to support carrying out the core business.
Internal FM unit	Customer and internal provider	Buys the services from the outsourced provider (in the role of customer) and/or provides services in-house to make sure that the organization can carry out the core business (in the role of internal provider).
Employees	End-users	Actually receive and consume the services while carrying out the core business of the "Organization".
Outsourced provider(s)	Provider(s)	Provide the services that allow the organization to function, by negotiating with the internal FM unit to serve the employees in the role of end-users

The complexity of the FM service system resides in the different roles played by top management and employees, along with the double role of the internal FM unit (Coenen et al., 2012) and the different types of ICT that connect and support the different actors, e.g., online energy systems or FM supply chain systems. Borrowing the terminology from marketing literature, in FM services the organization as a whole plays the role of the client, which, to properly function and carry out its core business, orders the service to the internal FM unit. The internal FM unit plays (1) the role of the customer in the eyes of the outsourced FM provider, with whom it negotiates the terms of the FM service provision; (2) the role of the internal provider from the perspectives of the end-users, who relate to the internal FM unit when an issue in FM services prevents them from carrying out the core business. The end users are the employees of the client organizations, i.e. the individuals that are provided the actual FM services.

FM services are combined in specific and *ad hoc* bundles of tasks, activities and services depending on the market and context in which the client organization operates. Due to their supportive nature, FM services have mostly been characterized as a secondary activity within organizations, and have been paid attention only in connection with the core businesses of the entities they support. However, FM organizations have often demonstrated the dedication and drive to implement new service development and exceed customer expectations, while adding value to the core business of the client organization (Mudrak et al., 2005; Pitt & Tucker, 2008).

Previous FM research has shown that FM organizations continuously manage innovation as a process and tend to have several projects under development at the same time (Cardellino & Finch, 2006; Mudrak et al., 2005). However, they lack the ability to establish progressive innovation routines that would enable a successful innovation management. As a set of support services, FM involves a heterogeneous range of internal and external stakeholders (Coenen et al., 2012) with different needs and expectations when it comes to service innovation. The need for cooperation between the different stakeholders involved in FM innovation is recalled by Goyal and Pitt (2007), due especially to the complexity that characterizes the management of

interactions in FM services. Noor and Pitt (2009) also conclude that an innovative partnership approach is crucial to bridge the demand and supply (in-house or outsourced) of FM service delivery by building an innovation network within the actors involved. However, previous research has not yet expressly addressed the dynamics of user involvement within FM service innovation, which is what we aim at understanding in this paper.

Theoretical grounds

Understanding services and service innovation

According to Bitner, Ostrom, and Morgan (2008) one of the most distinctive characteristics of services is their process nature. Unlike tangible goods, services are dynamic and unfold over a period of time through a sequence or constellation of events and steps. Moreover, services often require face-to-face interaction between the provider and the consumer as production and consumption often take place simultaneously. Although such simultaneousity is not always true, services are perishable and cannot be stored, and their consumption usually starts right after production (den Hertog, 2010; Sundbo, 1997).

The service innovation process has been defined as the process through which an idea for a new service, or for the renewal of an existing service, is developed and carried into practice to offer added value to the customer and provide benefit to the provider. To be classified as an innovation, the new service or the service renewal must not only impact the developer but involve elements that allow reproduction in different contexts (Sundbo, 1997). There are several terms used in the literature to address the way new services are developed. New service development and systematic service innovation deal with the overall process of developing new services and are concerned with the complete set of steps from idea generation to commercialization of the service, even though some literature on service innovation only focuses on the idea generation phase. In this paper, the terms service innovation and new service development will be used interchangeably.

For the purposes of this article, service innovations are defined according to the three Schumpeterian criteria, adapted to FM service innovation: (1) FM innovation is an idea, which is developed and carried into practice; (2) FM innovation brings benefits to its developer; and (3) FM innovation is reproducible, i.e. applied more than once (Sundbo, 1997; Toivonen & Tuominen, 2009). Not only new-to-the-world FM services are included in this study, but also new-to-the-firm (new-to-the-client) FM services, as (1) FM services are commonly adapted according to the characteristics of the client and thus require innovation management at the client side, but at the same time – in big organizations such as the ones involved in this investigation – they are reproduced across different FM services and areas of the organization, and therefore

classifiable as innovation; (2) even when only new-to-the-firm, the new FM services originate organizational change processes in the customer FM unit and client (Nardelli, 2013).

User involvement in service innovation

Service innovation and new service development are different terms used to address the different ways organizations develop new service offerings (Goldstein, Johnston, Duffy, & Rao, 2002). Whether service innovation processes are planned, or happen *ad hoc* (Gallouj & Weinstein, 1997) the involvement of users is increasingly being recognized as potentially supporting of a successful innovation outcome. For example, open innovation literature looks at how organizations can and should use external as well as internal ideas and path to market to advance in the technology, offering and business models (Chesbrough, 2003). Research on lead-users, on the other hand, looks more specifically at the involvement of users who investigate new opportunities because they experience customer needs before the market (von Hippel, 1986), while co-innovators are those advanced users who can combine existing products in new ways (Chesbrough, 2003). Service innovation literature, more specifically, has highlighted how the proactive and systematic involvement of users in new service development processes, if managed correctly, is able to support such development and implementation of ideas (Alam & Perry, 2002; Alam, 2002; Magnusson, Matthing, & Kristensson, 2003; Matthing, Sandén, & Edvardsson, 2004; Nicolajsen & Scupola, 2012; Scupola & Nicolajsen, 2010), as well as it has presented and discussed tools for such user involvement, e.g., workshops (Matthing et al., 2004) and online idea competitions (Nicolajsen & Scupola, 2012).

To illustrate how customers can be involved in the innovation process, this study draws on the service innovation model developed by Alam and Perry (2002) and on the customer roles in the innovation process by Nambisan (2002). Even though these models have been developed in a business-to-consumer context, we argue here that they can be applied in complex service systems, such as FM, since usually the involvement takes places at the individual level, i.e. the employees, even in an inter-organizational, business-to-business, setting. Alam and Perry (2002) presented a 10-stage model of the service innovation process, including: (1) Strategic planning; (2) Idea generation; (3) Idea screening; (4) Business analysis; (5) Formation of cross-functional team; (6) Service and process design; (7) Personnel training; (8) Service testing and pilot run; (9) Test marketing; (10) Commercialization (see the first column in Table 4), and discussed user involvement in each of the stages. Alam and Perry (2002)'s contribution takes into account the core element of user involvement in service innovation and highlights the objectives, purposes, stages, intensity and modes of user involvement in new service development. It is therefore useful as a ground to build the conceptual framework that is needed to investigate the heterogeneous user roles in FM service innovation.

Nambisan (2002), on the other hand, has conceptualized three roles that can be played by customers in new product development: (1) customer as a resource; (2) customer as co-creator; (3) customer as user. Such roles have been previously applied to the context of service innovation (Nicolajsen & Scupola, 2011), and are here explained in relation to the NSD model by Alam and Perry (2002). Firstly, the contribution of customer as a resource is variable, and depends on the alignment of offered services with the customer base. One possible argument is that the more the provided services are aligned with the customer needs and expectations, the less the customers will actually contribute to the service innovation process, which will make the ideas generated by such role more incremental than radical. When playing the role as a *resource*, customers are usually passive: it is the provider that needs to find out about customers' opinions, needs and expectations through, for example, surveys or focus groups. Secondly, customers can be involved as *co-creators*, and thus participate in various activities, from design to development of the new service. Customer-firm interactions in this type of involvement tend to be more intense and frequent, and the support mechanisms for such interactions are expensive, time consuming and technology intensive. Finally, customers can play the role of *users* through service testing and service support. When involved as users, customers test the service and provide feedback based on their experience, which allows the service innovators to improve their offering when reproducing the service innovation.

Tools for user involvement in the service innovation process

Organizations use diverse tools to systematically involve users in service innovation processes, which have been discussed in existing literature (e.g.,Prandelli, Verona, & Raccagni, 2006). Face-to-face interactions in the form of, for example, workshops, focus groups, user visits and meetings have been found very important to successfully involve users in the service innovation process (e.g.,Alam, 2002; Magnusson et al., 2003; Matthing et al., 2004). However, ICT-based tools are increasingly gaining importance thanks to their ability to capture and store generated data and to their independence from geographical location. Prandelli et al. (2006) have, for instance, identified 28 different web-based tools that can be used in the different stages of product innovation. These web-based tools range from surveys and 'complaint areas' used in the idea generation phase to 'virtual product tests' in the product test phase. In addition, Prandelli et al. (2006) found that the web-based tools are mainly used by larger corporations in the first and last stages of the innovation process, and are mainly considered as substitutes for offline practices.

Customer involvement tools are here distinguished into two main categories: face-to-face and ICT-based tools. Furthermore, such tools are classified into those requiring a direct and pro-active involvement from the users ("direct", e.g., workshops and online idea competitions), and those where users have a more passive role, meaning that they are mainly observed from outside actors to gain insights into their needs and expectations ("indirect", e.g., ethnographic studies and

virtual communities). Based on these classifications, a taxonomy of use involvement tools is proposed in Table 2.

Table 2: Taxonomy of tools to involve users in service innovation.

Support tools	Face-to-face	ICT-based
Direct	Workshops	Online idea competitions
	Interviews	Blogs
	Focus groups	Facebook
		E-forums
Indirect	Ethnographic studies	Online discussion groups
	Paper-based surveys	Virtual communities
	Complaint boxes	Online surveys
		Log data

Research methods

To answer the research question, a qualitative research method has been chosen because qualitative data "are the source of well-grounded, rich description and explanations of processes […] and help researchers go beyond initial pre-conceptions and frameworks" (Miles & Huberman, 1984, p.15). By following Miles and Huberman (1984)'s guidelines for conducting qualitative research, this research started with a literature review of studies investigating service innovation and user roles in service innovation in general, which was followed by an empirical investigation in the FM field.

Data for the study were gathered from archival sources, interviews with companies as well as attendance in practitioner conferences and workshops on the topic of innovation in complex FM services. In all, 19 explorative, semi-structured interviews among FM service practitioners, i.e. facility managers working in internal FM units and outsourced providers, were carried out in 15 Danish companies (Table 3). Furthermore four in-depth interviews were carried out in two of the companies involved in the study, and aimed at gathering more details and examples of the innovation processes that were spotted during the initial explorative round of interviews. The themes of the interviews included the management of new service development in general, and, more specifically, the structure and characteristics of interaction among stakeholders, the features and impact of user involvement in service innovation, and the face-to-face and ICT-based tools that are used to support processes of FM service innovation.

The interviewees were selected with a combination of convenience (at the beginning) and snowball (later on) sampling criteria (Eisenhardt, 1989). All interviews were tape-recorded and transcribed, and notes were taken both during and after the interviews. To increase reliability, an interview protocol was used and a database was developed (Yin, 2009). The respondents, all senior managers or directors, were somehow involved with FM innovation within their organizations.

To complement the interview data and ensure triangulation (Eisenhardt, 1989; Yin, 2009), archival data, i.e. reports, power point presentations, emails, newsletters, corporate brochures, were collected both from the interviewees and from secondary sources, such as corporate websites and during conferences, and were analysed along with the interview data through subsequent steps of open and axial coding. The collected data were analysed deductively by using the conceptual framework based on Alam and Perry (2002) and Nambisan (2002), with the support of the qualitative data analysis software Atlas.ti. The data were analysed from the perspective of the outsourced provider and the internal FM unit, which, within the FM context, is not only the customer but also the internal provider of the client organization. Therefore, when investigating user involvement in FM service innovation processes, it is interesting to look at how the internal FM unit (a) is involved as customer in relation to the outsourced FM provider; (b) involves top management and employees when developing new services together with the outsourced provider. The setting in which we investigate user involvement is thus a complex setting constituted by the relationship between the client organization and the outsourced FM service provider.

Table 3: Companies and interviewees involved in the study.

Company code	Role of company with respect to FM services	Core business	# employees	Position of interviewees
1	Client	Financial services	32500	Head of Contract Management & IFM Development
2	Client	Logistics	n.a.	Global Facility Management
3	Provider	Cleaning	300	CEO
4	Client	IT services	98000	Facility Manager
5	Research group	Research group	n.a.	Expert
6	Provider	Hard FM services	8000	Market Manager
7	Client	IT services	430000	Real Estate Site Operations Manager
8	Consultant/provider	Consulting	6200	Senior Project Manager
9	Client	Industrial biotech	5500	FM Director
				FM Manager
				FM Project Director
10	Provider	FM services	534500	Head of Knowledge Sharing and Engagement
				Commercial Director and CFO
				Director of Business Development
				Segment Director
11	Provider	Real estate	370	Head of Operations
12	Provider	Technical FM	162000	Nordic Head of Projects
				Regional Director Projects Nordics
13	Client	Transport	5500	Facilities Manager
				Group Procurement Manager
14	Client	Telecom equipment	7500	Global Head of Facility Management
15	Provider	FM services	7000	Director of Business Development

Analysis and results

This study aims at understanding user involvement in FM innovation processes in the setting of the client organization and the outsourced FM service provider. Therefore, the perspective of the providers is taken to investigate which different user roles the stakeholders of the client organization, i.e. the users, play in the service innovation process. As explained above, within the FM service system two main stakeholders are to be considered as providers: the outsourced FM providers and the internal FM unit. In FM services, innovation processes can be carried out by (a) the outsourced provider or (b) the internal FM unit individually, but also (c) in collaboration

between the two parties. Since the focus of this investigation is user involvement within open innovation, the innovation processes considered in the data analysis are only those that were carried out in collaboration between the outsourced provider and the internal FM unit. These service innovation processes can be initiated for different reasons, e.g., the contract obligations of the outsourced providers and/or the direct requests of internal FM units, and tend to involve users to various degree, as described below.

In FM service systems, service innovation or new service development can be characterized as a rather open process. The data indicate, in fact, that the client organization, the internal FM unit and the employees, i.e. the users, play the roles of *resource* and *co-creator* – although heterogeneously and to a various degree – throughout the new service development process, and up until the stage of service testing and pilot run. In the final two stages of the service innovation process (Test marketing; Commercialization), on the contrary, the study finds that the client organization, the internal FM unit and the employees are passively involved as *users*, if involved at all. The next sub-sections will more in-depth present the results of the study, summarized in Table 4 according to (1) stages of the service innovation process (Alam & Perry, 2002); (2) stakeholders of the FM service innovation; (3) stakeholder roles (Coenen et al., 2012); (4) user roles (Nambisan, 2002); (5) supporting tools.

Table 4: Main findings.

Stages of the service innovation process	Stakeholders of FM service innovation	Stakeholder roles	User roles	Supporting tools
(A) Strategic planning	Organization	Client	Resource; Co-creator	Regular and *ad hoc* meetings; workshops
	Internal FM unit	Customer	Resource; Co-creator	Workshops; trust-based relationships
	Employees	End-user	Resource	User-surveys; interviews; workshops
(B) Idea generation	Organization	Client	*Not involved*	*N.A.*
	Internal FM unit	Customer	Resource; Co-creator	Workshops; ICT for information management and sharing
	Employees	End-user	Resource	Idea competitions w/ or /o ICT support; user surveys; workshops
(C) Idea screening	Organization	Client	Resource	Transparency matrices and models; workshops
	Internal FM unit	Customer	Co-creator	Face-to-face meetings; ICT for information management and sharing
	Employees	End-user	User	User surveys; user workgroups; workshops
(D) Business analysis	Organization	Client	Resource	Transparency matrices and models
	Internal FM unit	Customer	Resource; Co-creator	Face-to-face meetings; ICT for information management and sharing
	Employees	End-user	*Not involved*	*N.A.*
(E) Formation of cross-functional team	Organization	Client	*Not involved*	*N.A.*
	Internal FM unit	Customer	Co-creator	Workshops; team building activities
	Employees	End-user	*Not involved*	*N.A.*
(F) Service and process design	Organization	Client	*Not involved*	*N.A.*
	Internal FM unit	Customer	Resource; Co-creator	Face-to-face meetings; ICT for information management and sharing; workshops
	Employees	End-user	*Not involved*	*N.A.*
(G) Personnel training	Organization	Client	*Not involved*	*N.A.*
	Internal FM unit	Customer	Co-creator	Workshops; shared training; team building activities
	Employees	End-user	Co-creator	Workshops; shared training; team building activities
(H) Service testing and pilot run	Organization	Client	Resource	Scenario analysis w/ or w/o IT-based simulation
	Internal FM unit	Customer	Co-creator	Scenario analysis w/ or w/o IT-based simulation
	Employees	End-user	User	User surveys
(I) Test marketing	Organization	Client	User	*Ad hoc* meetings
	Internal FM unit	Customer	User	Workshops
	Employees	End-user	User	User surveys
(J) Commercialization	Organization	Client	User	*(observation by provider)*
	Internal FM unit	Customer	User	*(observation by provider)*
	Employees	End-user	User	*(observation by provider)*

User involvement and user roles in FM service innovation processes

In FM services, the organization as a whole, internal FM units and end-users of the client organization represent diverse sets of users, and each may play different roles in FM service innovation processes. The empirical evidence collected here indicates that the internal FM unit tends to cooperate with outsourced providers in most phases of the innovation process, as *user*, *resource* or *co-creator*. Top management and end-users, on the other hand, mainly participate in innovation processes as *user* and *resource*, but on different levels. Top management is often involved by the internal FM unit to support and legitimate strategic decision-making, e.g., during the strategic planning and the business analysis stages of the FM service innovation process. End-users, conversely, are usually more or less directly involved in the more operational phases of the innovation process, such as idea generation and personnel training.

Stages of the new service development, during which strategic decision making takes place (e.g., strategic planning and business analysis) are those in which the most direct user involvement (as *resource* and *co-creator*) tends to be required, especially from the internal FM unit and the top management, who represents the interests of the organization as a whole. Strategic decisions, such as the ones taken along the strategic planning or business analysis stages of the new service development, require the direct involvement of the top management, along with that of the FM unit, especially when significant investments and efforts are related to the service innovation. For example when the internal FM unit of company 1 (FM client) has decided to initiate an Integrated FM (IFM) project, they have led the strategic planning before going out and looking for suppliers, and have done so by constantly referring to and involving top management in decision making.

Moreover, regularly scheduled meetings are usually organized between the internal FM unit and top management to discuss the strategic development of the organization as a whole and the consequent adaptation needs of FM. The internal FM unit is then in charge of integrating all strategic considerations in the innovation processes developed by the outsourced providers. In case of sudden instance, e.g., a crisis, meetings between the internal FM unit and top management can also be called *ad hoc*, to discuss potential consequences and responsive counter-actions. In company 9 (FM client), for instance, top management has asked the internal FM unit to find a solution to reduce travelling costs for the organization (top management involved as *co-creator*). This resulted in a shared strategic planning between the top management and the internal FM unit, who then took over the innovation process along with the outsourced provider.

The customer, i.e. the internal FM unit, gets directly and indirectly involved throughout most stages of the innovation process, not only as *resource*, but also, and even more, as *co-creator*. For instance, when the innovation process in question does not strategically and/or financially

concern the organization as a whole, e.g.,in the case of single service innovations, it is the internal FM unit that carries out the strategic planning of innovation processes. In such cases, the internal FM unit either influences the outsourced providers indirectly by setting the guidelines (involvement of the internal FM unit as *resource*) or works on the strategic planning and on its implementation together with the outsourced providers (involvement of the internal FM unit as *co-creator*).

On the contrary, operational stages such as idea generation and screening, among others, are left to the providers, unless the innovation process has a peculiar relevance for the client organization. In company 2, for example, an FM client stated how external providers should be in charge of the operational tasks of the innovation process, and especially idea generation, while the internal FM unit would rather be involved in the idea selection to make sure all needs and expectations of the end-users are taken into consideration. Innovation is, in fact, usually one of the activities, which the outsourced provider is expected by contract to carry out. The internal FM unit is thus not always keen on being directly involved in the operational phases. Therefore, the outsourced provider is usually in charge of the idea generation and the subsequent management of the innovation process.

The internal FM unit, however, may decide to be involved in operational activities for the new service development process either because of a specific interest in the upcoming project, or of a proactive entrepreneurial drive. The internal FM unit has two options for involvement in the innovation processes, initiated by the outsourced providers. It can either decide to be directly involved, by sharing ideas with the outsourced providers (*co-creator*); or send out idea competitions to their end-users to collect ideas, whose outcomes will then be shared with the outsourced providers. In the latter case, the involvement would be as intermediary, while the end-user would be involved as *resource*.

End-users, finally, tend not to be involved in the strategic decisions, as their heterogeneous needs are believed to (a) not correspond to those of the organization and (b) often be too operational. Their involvement would thus be too complex and resource consuming. Nevertheless, end-users seem to be involved, as *resource* and, most of all, as *users*, in various phases of new service development processes. Such involvement takes place through the intermediate action of the internal FM unit and/or the outsourced provider, which may decide to use ICT-based tools, e.g., email or Intranet, to distribute idea competitions and user surveys. In alternative, this may take place with face-to-face interviews, workshops and workgroups in the initial stages (idea generation and screening); and shared training and team building in the latter ones (formation of cross-functional teams and personnel training). For instance, company 14 (FM client) requires its providers to regularly distribute user surveys to ensure a specific level of user satisfaction, while company 10 (FM outsourced provider) carried out interviews with end-users to

delineate their needs and expectations to generate ideas. The aim of such initiatives combines (a) collecting feedback on existing services to better match needs and expectations in the innovated ones; (b) asking for potential ideas for improvements and innovation; (c) build awareness on the activities of the FM unit. In addition, ideas and feedback are continuously collected per email and/or customer relationship management tools. End-users use the ICT tools to submit their feedback and proactive ideas to the internal FM unit, which operates as filter, and pre-selects the ideas to submit to the outsourced provider for screening and, potentially, development.

Tools for user involvement in the FM service innovation process

Based on the depicted findings, Table 5 synthesizes the support tools that are and can be used to facilitate user involvement in open new service development within FM context. The tools are classified in relation to the roles of the users and their involvement within FM service innovation processes.

Table 5: Classification of support tools in relation to user roles and involvement.

	User	**Resource**	**Co-creator**
Organization as a whole/Client	• *Ad hoc* meetings	• Transparency matrices and models • Workshops • Scenario analysis (with or without simulation IT)	• Regular and *ad hoc* meetings • Workshops
Internal FM unit/Customer	• Workshops	• Workshops • Shared training • Team buildings activities • IT for information management and sharing	• Workshops • Face-to-face meetings • ICT for information management and sharing • Team building activities • Scenario analysis (with or without simulation IT)
Employees/End-users	• User-surveys • User workgroups • Workshops	• User-surveys • Face-to-face interviews • Workshops • Idea competitions • Shared training • Team-building activities	• Shared training

Even though the role of ICT in service systems is generally pervasive, in the specific context of supporting user involvement in FM service innovation this study finds that ICT-based tools have a more marginal role in comparison to face-to-face tools. Among the support tools, in fact,

workshops appear to be the preferred tool for most user roles and involvements. The interviewees have depicted workshops as useful support tools in heterogeneous situations, as they can be adapted in the structure and functioning to specific contexts and needs. For example, workshops organized with outsourced providers and internal FM units are used to involve the latter as users (e.g., in test marketing), as co-creator (e.g., personnel training), and as resource (e.g., business analysis).

ICT-based tools are mostly used to support information sharing and management, and, in some cases (e.g., scenario analysis and transparency matrices), to facilitate communication between different sets of users (e.g., between internal FM unit and top management of the client organization). On the other hand, the importance of partnership-like relationships with the outsourced providers, based on trust between individuals, is mirrored in the relevance of face-to-face meetings, especially to support involvement as co-creators, not only of the internal FM unit, but also of top management and end-users.

Top management needs to be involved through less "requiring" tools, such as regularly organized and *ad hoc* meetings, facilitated through scenario analysis and transparency models. This seems to be due to the need to demonstrate the professionalism and value of FM services, along with the non-strategic focus that top management tends to attribute to FM services.

Finally, end-user involvement appears to be supported mainly through ICT-based user-surveys and interviews, which allow collection of end-user perspectives without direct involvement (requiring more intermediating effort by the internal FM unit). Nonetheless, end-users are sometimes involved as co-creators through idea competitions and workshops, which not only support the new service development, but also increase awareness of FM within the organization. Shared training and team building activities facilitate direct involvement as resource and co-creators and allow opening the innovation process while getting closer to the actual needs of the end-users.

Discussion and conclusion

Given the complexity of FM service systems, it becomes important, when investigating FM service innovations, not only to look at the FM innovation process stages, as stated in the literature, but also to consider the different roles that FM users might play when involved by the providers in such a FM innovation process. To investigate how FM service users can be involved with different roles through the FM new service development process, we have considered the user roles, i.e. resource, co-creator and user, presented by Nambisan (2002) to analyse the stages of the innovation process as described by Alam and Perry (2002). Furthermore, we have outlined the various tools, which FM organizations use to involve and engage the users in FM service innovation processes.

The results of the analysis indicate that, not only the involvement of users is variable depending on the offered services (Alam & Perry, 2002), but also on the specific role that users play with regards to the service being innovated, when involved in FM service innovation processes. This is due to the complexity of FM service systems, where clients, customers and end-users do not represent a single typology of user, but rather have different needs and expectations with respect to the FM service innovation. These needs and expectations have to be matched and balanced for the service innovation to be successful, which is why the providers, who are in charge of FM service innovation, tend to involve different stakeholders in the same stage of the new service development process, but with different roles and variable degree of involvement. This implies that, for instance, customers, who buy the service, are involved as *co-creator* in the stages of new service development that require strategic decision making, to ensure a better match between the service innovation and the specific needs of the client, who orders the service, and the end-users, who finally receive the service. The client, represented in FM service systems by the top management of the organization ordering the services, is instead mostly involved as *resource* – to ensure a proper fit between the service innovation and the overall vision and mission of the organization. Finally, end-users are the least involved, called in as *resource* or *user* to ensure satisfaction, but without allocation of actual power in the new service development process. The data also indicate some trends in the use of face-to-face vs. ICT-based tools to involve different types of users, and for different roles: the first are more common for user involvement as *co-creators*, while the latter support direct and indirect involvement as *resource* and *user*.

These results extend and contribute to the literature on service science and information systems by investigating user involvement in complex service systems such as FM services, by highlighting which user involvement process might be followed, and which tools might be used to increase user satisfaction in the service innovation process. The study suggests that this might be achieved by involving different types of users in different stages of the service innovation process, with different roles and to a variable degree depending on what they can best contribute with, given their relation with the goal of the service innovation process. The focus on FM services depicts a setting, which was not addressed before in terms of user involvement in service innovation, but, and more interestingly, might be taken as an example for other business-to-business support services with complex value chain, such as IT services.

The theoretical implications of this study are linked to the importance of considering stakeholder roles when dealing with user involvement for service innovation. This, in fact, might help to investigate user involvement in service innovation in more depth and details. For practitioners, on the other hand, this implies that, before involving users in service innovation, their role as clients, customers or end-users should be assessed to increase the potential of their contribution.

Nevertheless, this study also has limitations. Firstly, the focus on FM service systems might limit the applicability of the results to other service contexts. Secondly, the data were collected among a relatively small amount of organizations in Denmark, which reduces the external validity of the study. Thirdly, theoretical models developed in business-to-consumer contexts were applied in a b-to-b complex FM context. To overcome the limitations, and increase the generalizability of these results, future research could for example replicate this study in other complex service systems with multiple stakeholders. In addition, further studies could expand the focus to other aspects of open service innovation, and look, for instance, at how the different stakeholders of complex service systems distribute and appropriate the value that is created through user involvement in new service development processes – and which tools can support such value appropriation.

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PAPER 5

Nardelli, G., Jensen, J. O., & Nielsen, S. B. (2015). Facilities management innovation in public-private collaborations: Danish ESCO projects. Journal of Facilities Management, Forthcoming, 13(2).

Please notice that this paper follows the guidelines of Journal of Facilities Management and thus adopts the Harvard style of referencing instead of the APA style (6th edition), which is used in the rest of the dissertation.

FACILITIES MANAGEMENT INNOVATION IN PUBLIC-PRIVATE COLLABORATIONS: DANISH ESCO PROJECTS

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Abstract

Purpose: The purpose of the article is to investigate how Facilities Management (FM) units navigate Energy Service Company (ESCO) collaborations, here defined as examples of public collaborative innovation within the context of FM. The driving motivation is to inform and inspire internal FM units of local institutions on how to navigate and manage collaboration of different, intra- and inter-organisational actors throughout ESCO projects.

Design/methodology/approach: A deductive research methodology was applied based on the first 10 ESCO projects in Danish municipalities between 2008 and 2012.

Findings: A model of FM roles in FM public innovation is proposed. The internal FM unit (1) coordinates between clients and end users by acting as translator and demonstrator; and (2) collaborates with the ESCO company to implement the energy renovation (FM processor).

Research limitations/implications: The data were collected from a limited sample of ESCO collaborations in Denmark. Future research should thus investigate collaborative innovation in ESCO (and other forms of private-public) collaborations outside of Denmark.

Practical implications: Not only should FM units clarify what different stakeholders expect from an ESCO collaboration, but also they should (1) translate stakeholders' expectations into actual goals and objectives; (2) process them together with the ESCO company; (3) demonstrate their execution to all stakeholders throughout the process, not just when closing the collaboration.

Originality/value: This paper contributes to FM innovation research by exploring FM innovation in the public sector and by depicting the coordinating role of local governments' internal FM units engaging in public-private collaborative innovation.

Keywords: FM innovation, energy optimisation, ESCO, public FM, FM roles, sustainable FM.

Paper type: Research article.

Introduction

As in many other developed countries, many local governments in Denmark have committed themselves to the national climate agenda, which implies fixed objectives of CO_2 reduction while at the same time being required to address a huge maintenance backlog in municipal buildings. Public buildings' energy consumption accounts for a large share of overall national energy use, meaning that local governments are expected to comply with the national objectives of CO_2-reduction, despite their struggle to operate within tight budgets. In addition, local governments have to meet general public expectations of well-renovated buildings. This implies that an upgrade in building stock will help local governments to reduce energy consumption, thus conforming to the national climate agenda and satisfying local citizens' general expectations.

Facilities Management (FM) units of local governments play a crucial role in creating solutions to face these daunting challenges, because within local public institutions, they are in charge of managing the building stock and its energy consumption. ESCO collaborations, among others, represent a novel, cost-neutral opportunity to energy-renovate public building stock through a collaboration between a public institution and a private party, i.e., the Energy Service Company (ESCO) (Jensen et al. 2013).

According to the EU Directive on Energy End-Use Efficiency and Energy Services (European Parliament & Council of the European Union 2006) an energy service company (ESCO) is defined as "a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises and accepts some degree of financial risk in doing so. The payment for the service delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria". An ESCO company provides a package that consists of technology, project management, education and building monitoring pursuant to a long-term contract and assumes the eventual risks of not reaching the promised energy savings, thereby guaranteeing the client a particular amount of energy savings (Jensen et al. 2013).

Scholars of the public sector have highlighted the need for a new form of innovation in local and national institutions based on collaboration between various public and private parties. Closed processes do not seem to allow public entities to solve the many emergent and persistent challenges that might be overcome through the cooperation of public and private actors (Bommert 2010; Sorensen & Torfing 2012). ESCO projects can be associated with such collaborative innovations in the public sector because they are based on a public-private collaboration and allow public entities—i.e., local governments—to solve the emergent challenge of energy renovation with limited resources and high expectations. A partnership between a local

government and a private ESCO provides the public institution with the necessary resources to locally implement energy renovations on its building stock, which contribute to its compliance with national climate agreements. Moreover, compared to more traditional in-house energy reduction projects, in which minor solutions are implemented step by step, an ESCO offers an innovative approach to energy optimisation. ESCO collaborations are based on (1) output-based contracts; (2) the guarantee that a defined amount of cost savings will be reached within a specific number of years; (3) a long-term collaboration between public and private parties; and (4) short-term refurbishment and immediate, consequential savings (Jensen et al. 2013).

Although ESCO collaborations have been recognised to offer significant benefits to local governments that must conduct energy renovations under conditions of limited resources and high expectations, they also carry some disadvantages compared to the traditional in-house approach (Jensen et al. 2013). First, ESCO collaborations involve transaction costs, including tendering, contract management and negotiations on baseline adjustment and costs that tend to increase with the complexity of the ESCO contract. They require higher degrees of coordination between energy retrofitting and building maintenance compared to in-house models, which are therefore considered by public FM managers as easier to handle. In addition, municipalities' internal FM units usually have limited experience with long-term collaborations, and local governments' knowledge of the functioning of an ESCO model is still lacking. Other issues are the in-house FM organisation's reluctance to accept a partnership with an external, private party, the fear of "losing control" of the energy renovation and seeing learning retained by the ESCO provider, and the uncertainty of managing changes in the future building portfolio (e.g., if the municipality decides to sell the building while the ESCO contract is still running).

The purpose of this paper is to analyse public-private collaborations in light of innovation theories to investigate how partnerships between public and private parties can result in FM innovations that can tackle the energy renovation challenges that affect local governments. The paper uses examples from Danish ESCOs to analyse these issues.

Despite increasing academic interest in the issue of collaborative innovation in the public sector, the focus has been on when and how multi-actor, intra-organisational collaborations can enhance public innovation (Bommert 2010; Sorensen & Torfing 2012). Although existing research on collaborative innovation in the public sector can certainly support an in-depth understanding of ESCO collaborations, we believe that such public-private partnerships require a dedicated research effort. However, we argue that ESCO collaborations have the potential to spark different types of innovation compared to what has previously been described in the existing literature on FM innovation. Scholars of FM innovation either tend to emphasise the private sector or fail to differentiate between the characteristics of FM innovation in the private

and public sectors. Furthermore, previous research views the FM provider as the sole analytical unit and studies how FM can innovate within organisational boundaries.

In contrast, our research is dedicated to collaboration between public and private organisations, and aims at understanding how local governments' internal FM units navigate their interactions with internal stakeholders and the private ESCO to innovate throughout the ESCO collaboration. Here, the word "navigate" is intended to describe the process of interpreting a complicated landscape to decide which direction to follow by taking a basic structure (in this case, the structure of the public sector) for granted. Therefore, this study's research question is as follows:

How do internal FM units navigate and manage the collaboration of different, intra- and inter-organisational actors when innovating throughout ESCO collaborations?

By investigating the navigation and management of public-private collaborations such as ESCO projects, we aim at offering valuable insight to internal FM units of local governments on how to deal with innovation processes when heterogeneous parties are involved.

Theoretical background and analytical framework

Setting the stage: ESCO collaborations as innovation processes

FM is defined as a set of services that includes a wide range of support tasks and activities at the strategic, tactical and operational levels, whose interplay is crucial to create value for the stakeholders (Jensen 2008). Adopting this definition of FM makes it possible to analyse innovation processes within the context of FM by using theories on innovation in services. Services, including FM, are characterised by perishability, intangibility, variability, inseparability and non-ownership (den Hertog 2010; Jong et al. 2003). Due to services' inner features, innovation in this industry has often been found to be non-technological and primarily to involve small changes and improvements in processes and procedures (Jong et al. 2003). To understand how service innovation works, it is thus crucial to distinguish innovation's process from its outcome. Innovation processes correspond to the unfolding of the decision-making that leads to outcomes responsive to the following three criteria (Sundbo 1997). First, innovation is an idea that is developed and carried into practice. Second, innovation provides a benefit to its developer, which usually is derived from the added value perceived by the customer. Finally, innovation must be reproducible, which means that needs to be applied more than once (Sundbo 1997).

We argue that ESCO collaboration can be characterised as FM innovation processes in the public sector, because they result in outcomes, such as new processes for energy monitoring and new practices of cooperation between intra- and inter-organisational actors, which reflect the abovementioned criteria for innovation. Such outcomes are ideas, often generated by the ESCO

provider, which are developed and put into practice and which provide various benefits to the different parties who contribute to their development. The ESCO provider gains financial remuneration based on its success in reducing energy consumption within the pre-determined time frame, while the public institution achieves positive political attention from the guaranty of energy savings and from the visibility of savings from Day 1. Furthermore, the internal FM unit benefits from the outcome of an ESCO collaboration, because it can operate with much more capacity and speed in reducing energy consumption, it can be trained and thus learn how to manage energy reductions once the contract has expired and it can focus on operations and output instead of verification and monitoring. Finally, the desired outcomes of ESCO collaboration are specified in each contract on an ad hoc basis, but the internal FM unit and/or local governments can reproduce them in new contracts with external parties.

Innovation in FM

The field of FM services is increasingly recognised as a professional service sector and a scientific discipline. It has been argued that to further develop FM as a discipline, a research focus on innovation might be critical, whether it is pursued in-house or in collaboration with the outsourced partners (Mudrak et al. 2005). Similarly, Noor and Pitt (2009) suggest empowering the FM unit with a role in the organisation's innovation agenda, because this could be a way to position FM within the organisation itself and thus gain more visibility and strategic awareness. More specifically, they stress that FM should not limit itself to building management, but instead transform itself from a business support tool to a business change tool (Noor & Pitt 2009; Tay & Ooi 2001).

Despite the recognition of strategic capacity building and innovation as an independent option for FM, the collaborative dimension of FM innovation is a hitherto undiscovered research field. Existing research on FM innovation can be characterised as 1) not explicitly focusing on public-sector FM innovation; 2) often not noting the eventual differences between private and public sector FM; and 3) not presenting any explicit cases of facilitated collaboration with other actors in which FM adopts an independent, agenda-setting leadership role. Instead, FM innovation research appears to be largely aligned with FM strategy research, therefore taking an inward perspective. The FM innovator's playground is the organisation's internal dynamic, which expects FM to act as a business support tool. One way of transforming FM into a business change tool (Noor & Pitt 2009) could be by enhancing innovation processes through collaboration among diverse parties. We therefore aim to increase the understanding of innovation processes within FM in public-private collaborations by analysing ESCO collaborations through the framework presented in the next paragraph.

The analytical framework: the FM value chain and the role of the internal fm unit

Following the definition of FM as a set of support services, FM involves a heterogeneous range of stakeholders from both the supply and demand sides of service provision (Coenen et al. 2013). To investigate how public-private partnerships such as ESCO collaborations unfold and produce FM innovations, we developed an analytical framework based on (1) the complex relationship between supply and demand in FM services (Coenen et al. 2013) and (2) the roles that internal FM units play within organisations (Kaya et al. 2004). As stressed by recent FM literature (Coenen et al. 2013; Jensen et al. 2012), innovation is an important part of the activities carried out by FM internal and external providers to add value, which is why we apply Coenen et al. (2013) and Kaya et al.'s (2004) frameworks, originally developed for FM activities in general, to FM innovation in the public sector. Because we recognise the importance of a facilitating party for public collaborative innovation (Ansell & Gash 2012; Bommert 2010; Sorensen & Torfing 2012), the analytical framework aims to outline how an internal FM unit navigates the innovation processes that are associated with ESCO collaborations and manages the collaboration of different, intra- and inter-organisational actors.

Coenen et al. (2013) highlight how external and internal providers on the supply side address not only one homogeneous set of customers but also three different stakeholders—i.e., the client, the customer, and the end users. In ESCO collaborations, for instance, the roles of the different stakeholders are distributed among private and public actors. On the supply side of an ESCO collaboration, the roles of the external and internal providers are played by the private ESCO and the internal FM unit, respectively. Similarly, three primary stakeholders with different needs and expectations have been outlined on the demand side: (1) client; (2) customer; and (3) end users (Coenen et al. 2013). On the demand side, the client ordering the service is typically the local government to which the FM unit belongs and that is represented and managed by political actors from the local and national community. The FM unit is the customer, responsible for dealing with the outsourced provider and managing the collaboration to negotiate and achieve its energy optimisation objectives. Finally, the end users are the actual actors who benefit from the outcome of the collaboration, i.e., the civil servants, schoolteachers, students, etc. who work and receive public services in the facilities involved in the ESCO project.

Several authors have argued that FM units often lack recognition within organisations. On the contrary, FM units are seen as routine functionaries that should share responsibility to helping the organisation to reach its strategic goals (Kaya et al. 2004). In addition, FM units often have problems demonstrating their results. To demonstrate their strategic value, FM units might increase their integration within their organisations (e.g., through increased collaboration with other in-house units); increasingly, FM units contribute to business outcomes (Kaya et al. 2004). This goal can be achieved by playing the roles of translator, processor and demonstrator. As a

translator, the FM unit should be able to translate business needs into a strategy that defines the various project activities to be implemented. This implies that the FM unit also fulfils the processor role, i.e., that it implements and operates the projects that contribute to business needs, and the demonstrator role, i.e., that it demonstrates its contribution to the business strategy.

Figure 1 proposes an adaptation of Kaya et al. (2004) to the characteristics of the FM value chain in the public sector in an attempt to visualise the analytical framework that we use in this paper. The public sector must ensure public innovation that better responds to the needs of its citizens (Bommert 2010). This requirement must be combined with the FM units' needs to ensure that (1) civil servants (and other public end users) can work properly and (2) public buildings are well maintained. Therefore, the FM unit usually acts as a translator to design FM management in line with the policy and strategy of the local government that it serves, as a processor to ensure that FM management is actually implemented, and as a demonstrator to show the obtained results and provided services.

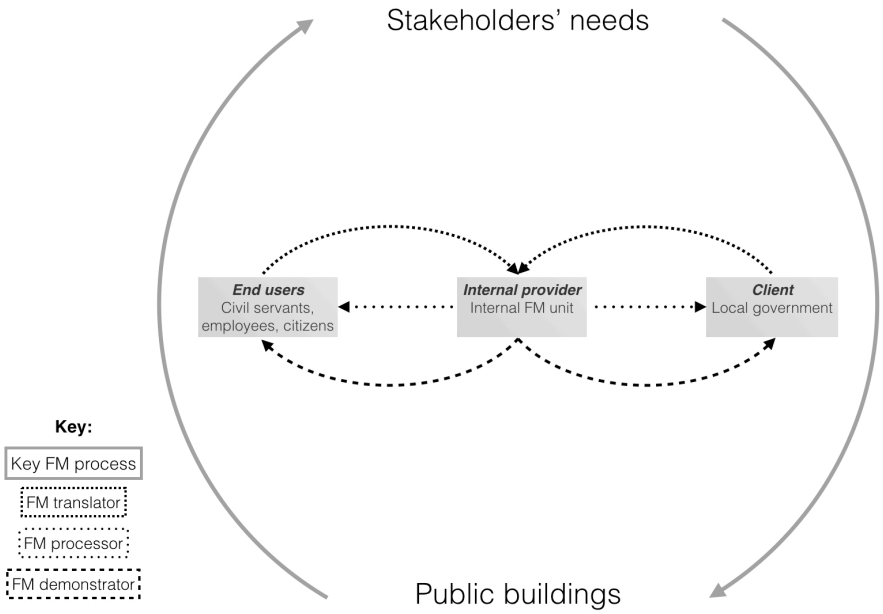

Figure 1: The analytical framework—the traditional FM unit role within the public sector

Therefore, in Figure 1 we highlight how a local government's FM unit usually acts as translator, processor and demonstrator to ensure the appropriate management of public buildings to satisfy the needs of all of its stakeholders. These stakeholders include the local government, all end users—e.g., civil servants, teachers and students who work and receive the public services in the targeted facilities—and the community as a whole. Kaya et al. (2004) do not include the external provider in their figure, which is why we also leave it out of our adaptation—although we are aware that the external provider(s) often collaborates with the internal provider, i.e., the FM unit of the local government, to ensure that the latter can carry out its function as FM processor. In the

analysis reported below, we examine the data in the light of this analytical framework with the aim of understanding how internal FM units navigate and manage the collaboration of different, intra- and inter-organisational actors when innovating throughout the course of public-private partnerships, such as ESCO collaborations.

Methodology

To explore Danish municipalities' experiences with ESCO collaborations and the related potential effects for innovation, this study adopted a qualitative research methodology. First, we reviewed popular and scientific publications, which we complemented with participation in diverse conferences and workshops on the topic to gain a general view of ESCO projects in Danish municipalities. On the basis of that overview, we then selected the 10 cases set forth below.

The empirical basis for this study consists of the first 10 ESCO collaborations implemented in Denmark, which we studied for the period between 2008 and 2012. We carried out 15 in-depth qualitative interviews with 18 leading civil servants in municipalities involved in ESCO projects. These interviews were then complemented with comparative interviews with representatives of local governments, which were implementing traditional in-house energy renovation projects, and also with private ESCO actors (one provider and one consultant). The purpose of the comparative interviews was to explore the perceived disadvantages of ESCO collaborations compared to in-house strategies. Therefore, we interviewed a representative of the leading ESCO company in Denmark. Such leading company had been in dialogue with most Danish municipalities. In addition, we interviewed an experienced Danish consultant. The consultant was selected as specialist on ESCO projects, whom, at the time of the interview, was working on a report on the potentials for energy renovation in public buildings. All interviews were prepared through comprehensive research on municipal ESCO initiatives, were based on a semi-structured interview guide (Appendix 1) and were carried out through a mixture of face-to-face and telephone interviews. The focus of the interviews was the interviewees' experiences with ESCO collaborations and their motivations related to such collaborations, with particular emphasis on managing the different actors during innovation processes.

To research motivation, we asked about the origin of the idea of introducing an ESCO collaboration, who came up with the idea and why the interviewee considered it to be a good idea compared to what they had done in the past. We researched the interviewees' experiences with ESCO by asking about the studied project, its characteristics, its organisation and their experiences. To explore their learning process, we included questions such as the following: "What are you most proud of?" "Have there been surprises along the way that you have learned from, or things you would do differently, if you had the chance?" In addition to the interviews,

the study included a survey of existing ESCO collaborations in Denmark along with and international literature studies of ESCO experiences.

Finally, a literature search was carried out to identify theories on innovation to interpret the empirical findings. Priority was given to the service innovation literature, given the adopted definition of FM as a combination of support services.

As the focus of the paper is to better describe the intermediary role of FM units of local institutions through public-private collaborations, we have investigated the experiences from the first 10 Danish ESCO projects. The research is qualitative due to the explorative nature of the study. In fact, existing literature on FM innovation has so far emphasised the private sector. Therefore, this study offers valuable insights on FM innovation beyond the boundaries of the private sector, and, more specifically, on FM innovation processes that are implemented through the collaboration between public and private parties. The main limitation of this research is that it is based on limited number of projects, which are largely varied in terms of scale (including, e.g., space, investment, savings, time). Nonetheless, at the time of the empirical investigation, this set of projects was the best available source for data collection on ESCO collaborations and FM innovation (Jensen et al. 2012), which is why we selected it for our study.

Research findings

The ESCO collaborations that we investigated are characterised by different scopes and innovation outcomes/improvements. Table 1 summarises the main characteristics of the ESCO collaborations in the municipalities that we investigated.

Table 1: Characteristics of 10 ESCO-projects in selected municipalities

Municipality contract period	Number of buildings Floor area	Investment, in €/m2	Guaranteed savings, in %	Improvements
Kalundborg 2009-2021	10 buildings 20,000 m^2	89	21%	Technical system and installations.
Middelfart 2008-2015	100 buildings 190,000 m^2	31	20%	Installations and indoor environment in all municipal buildings and re-insulation of a few buildings. Energy labelling of all buildings.
Copenhagen 2009-2018	27 buildings 68,000 m^2	24	20%	Energy savings and energy labelling of properties in the nursing facility "De Gamles By".
Gribskov 2009-2016	100 buildings 190,000 m^2	32	17%	Energy savings through better management of and technical improvements to buildings.
Vallensbæk 2009-2019	40 buildings 114,000 m^2	78	31%	Technical systems and building envelope for municipal buildings. Energy labelling
Kerteminde 2009-2019	60 buildings 117,000 m^2	51	17%	Installations, steering and building envelope.
Høje Taastrup 2009-2023	270 buildings (total), 270,000 m^2	38	14%	Installations, building improvements, renewable energy.
Halsnæs 2009-2021	120 buildings, 130,000 m^2	69	30%	Installations and building envelope, along with incentives for users to save energy.
Greve 2009-2016	12 schools 110,000 m^2	22	19%	Better heat regulation, ventilation and lighting in schools and kindergartens.
Sorø 2009-2022	68 buildings 140,000 m^2	65	22%	Energy systems and building envelope for all municipal buildings.

Our cases show different types of decisions, initiators and motivations. In general, the objective of ESCO collaborations is to reduce energy use and costs, in both the short and the long term. Nonetheless, this is a difficult target to measure, calculate and verify with precision, especially in the long term. The challenge of evaluating the outcomes of ESCO collaborations emerged as shared across all cases that we included in this study, and influenced the relationships between stakeholders and the decision-making dynamics. From our 10 case studies, it is clear that the central decision-makers in ESCO contracting (referring to the stakeholder groups outlined in Figure 1) are the client (local government), the internal FM unit and the ESCO provider. It should be noted that the term "ESCO" is generally used in a Danish context, although in practice it is referred to as "Energy Performance Contracting" (EPC) with financing from the client, i.e., there is no third-party financing.

The primary motivations for municipalities to engage in ESCO contracting are a combination of the factors listed below (Jensen et al. 2013):

1. The mandatory energy labelling of municipal buildings (see references to municipalities in table);
2. Voluntary agreements for climate-related reductions (see references to municipalities in table). Our interviews indicate that "Climate Municipality" and "Curb-cutter" deals present large challenges for municipalities, but that there is also political acceptance of the pursuit of energy savings;
3. Attractive financing mechanisms for energy reductions;
4. Solving limitations of personnel and finance capacity in municipalities; and
5. Reducing maintenance backlogs.

Looking at the decision-making processes behind the municipalities reveals various patterns related to ESCO-contracts that illustrate the importance of linking FM management to clients' overall strategic goals. However, the analysis also helps to expand the understanding of roles played by the various actors involved and to develop a model of FM roles in FM innovation within ESCO projects, which we present at the end of this analysis section. In the following paragraph, we depict the decision-making process that drives ESCO collaborations and related innovations and then introduce the FM roles played by the FM unit of local government within the context of an innovation process.

Decision-making process related to entering into an ESCO contract

In the majority of municipalities, the FM unit is the driver in the ESCO contracting arrangement. In several cases, FM staff members have started the process of reducing a municipal building's energy usage due to either the mandatory energy labelling of public buildings or political ambitions related to the pursuit of climate goals. This process typically has made those individuals aware of the challenges of obtaining an overview of the building stock, the use of the buildings, the energy consumption, etc., along with the limitations of the energy label in managing these challenges. Our informants from the municipal FM units often refer to challenges in completing the energy optimisation of the building stock and then becoming aware of the ESCO opportunity from consultants, professional magazines, conversations with colleagues, etc. In parallel, some of the leading ESCO providers have been active in promoting ESCO contracting to municipalities, arranging meetings with mayors, directors and FM staff. One ESCO provider claims to have had at least one meeting—and often several meetings—with each of the 98 municipalities in Denmark to explain how an ESCO contract works, along with its benefits for the municipality. In some cases, FM staffers have called an ESCO company to request a closer discussion, eventually leading to a contract.

> *"We could save 2% within a few years using our own municipal finances. But after that it would become difficult. Two percent per year is actually very ambitious… but then one of our consultants mentioned ESCO as an opportunity" (officer, municipality of Halsnæs).*

"We started energy labelling four years ago ... and discovered that its benefits were not so high. ... at the same time we started to explore the potential of the ESCO concept" (officer, municipality of Høje Taastrup).

Often, political ambitions are a first driver to start the process, but according to FM staff, political goals are often diffuse and are not always accompanied by a genuine political will or overall strategy to pursue those goals, as illustrated by the quotation below:

"If you had politicians that were really engaged, then you were already rolling, and you just needed to go on, instead of starting from scratch. But in our case it is better with an ESCO project, then you can see what you get for your money" (officer, municipality of Kerteminde).

There are fewer examples of municipalities where the city council has taken the initiative for ESCO contracting. Conflicts with the FM unit or within the FM unit might arise and lead to other types of initiatives. As an example, the Aarhus municipality had an ambition for a large-scale ESCO project, but it met severe resistance from local FM personnel, which resulted in a new energy-optimisation model that combined elements from the ESCO model but was based on an in-house implementation. In other municipalities, suggestions from the FM unit to start an ESCO project were opposed by the city council, for instance, in the municipality of Vejen, where an ESCO project was rejected by the city council and an internal energy-optimisation programme was set up instead.

The interaction and communication between an FM department and local politicians is often both complex and un-explicit, making it difficult to determine the precise origin of an initiative and how the decision-making procedure took place. The FM unit and relevant political representatives can form local alliances for or against ESCO, but ESCO suppliers might discuss the issue with individuals at other political levels in the city council, resulting in new political alliances. There are several examples in which ESCO suppliers, through meeting with politicians, have managed to change those politicians' attitudes towards an ESCO project and convincing administrative officers to enter into an ESCO contract rather than continuing with an on-going in-house energy optimisation project.

Political decisions about an ESCO are often based on presentations about the ESCO concept from FM units, which may have knowledge and understanding about the concept that is of variable quality, whereas discussions with an ESCO provider might provide other views on the issue of ESCO contracting.

Typically, the decision about whether to engage in ESCO contracting involves a comparison of ESCO contracting to an in-house effort. The ESCO provider will argue that the benefit of ESCO contracting is its guaranteed savings, resulting in an investment that is "safe". From a political and administrative point of view, the ESCO contract is a powerful tool to

document actual savings and to ensure that goals are met. This can be more problematic with in-house projects, in which a rigorous base-line correction is not carried out and the achieved savings therefore can be difficult to verify. This, however, also depends on the degree to which an FM unit must convince politicians of its achieved results.

In the cases involving FM officers as initiators, communication with politicians about formulating the ESCO project as part of a general municipal agenda has been a crucial point. In several municipalities, politicians have been actively involved in promoting ESCO contracting as a part of those municipalities' on-going policies. Energy savings and improvements in public buildings, as a type of public service provision, is now a central element of many municipal policies. Our case studies demonstrate that the ESCO contracts are often communicated as a part of an overall municipal strategy and its core elements, e.g., climate policy, the networking municipality, green growth, and service provision (for youngsters, families, the elderly, etc.). In some ways, the ESCO project changes the FM unit from a provider (with the municipality as its client) into a client (with the ESCO company as its provider), creating room for reflection about the FM unit's future identity. In several municipalities, the ESCO collaboration leads to discussions about the role of the FM, e.g., about the FM's core role and which competences the FM unit should maintain, such as energy retrofitting.

> *"...[W]e should teach the children, secure the roads, ensure the welfare of the elderly—but it is not necessarily our primary goal to be a building-maintainer, and definitely not with respect to energy optimisation" (officer, municipality of Gribskov).*

FM roles in FM innovation during ESCO collaborations

The translator role. The findings presented above suggest huge differences between FM in public buildings and FM in private buildings. First, as stated by Kaya et al. (2004), the role of the FM as translator is to link the company's business model to the workplace environment—whereas in the municipal FM, the FM's role is to provide the framework (buildings, services, facilities) for core municipal welfare services. Therefore, the FM unit's role as translator (Kaya et al. 2004) in a municipal context is somehow different from the translator role in a private company. The translator role in a municipal FM involved in ESCO contracting goes both ways to a much larger extent, not only translating the business strategy into measures for the FM process but also translating the FM unit's initiatives (e.g., ESCO-contracting) into the municipality's business goals or policy goals.

Another main issue is the relationship to the end users, including the buildings' users and operational staff. They need information about the retrofitting project and their needs and suggestions for the renovation should be heard, which is to say that the FM unit also acts as translator for the end users. The degree of user involvement in Danish ESCO projects is

extremely varied. Some projects have limited user involvement, focusing mainly on "regulating" end users' habits and practices to achieve energy savings, whereas other projects have more active user involvement, through both early involvement in project design and involvement throughout the operational phase, e.g., through programs that teach about sustainability and energy issues. In addition, user involvement might be a central issue with respect to in-house projects on energy retrofitting, but ESCO projects often focus more closely on how user habits influence buildings' energy use in the operation stage and thus, also raise the relevance of involving the end user.

A related issue is how to motivate end users to save energy, which soon leads to economic and organisational considerations, e.g., how energy is paid for and how the buildings are operated. In many municipalities, ESCO contracting often takes place in reorganised central FM units, who own or are responsible for operating a municipality's entire building stock, whereas previously, single municipal departments owned and operated their buildings. In such cases, an ESCO collaboration that includes all municipal buildings would be extremely complex. This illustrates that the organisational conditions for applying innovative concepts such as ESCO contracting are extremely important. ESCO consultants are very aware of this issue, and have urged municipalities to rethink their internal organisations when entering into ESCO contracts:

> *"… [I]f you do not reserve resources for organisational issues, then you're running a bad business" (ESCO consultant).*

Our interviews also show that ESCO collaboration often provides challenges with respect to communicating with end users, especially in the design and building stages. As a contractor, it is typically the ESCO provider that informs the end users about the program, the timetable, etc., but a municipality might find it strange to be excluded from the dialogue with the end users, particularly when the end users see the municipality as the responsible party in the event of problems. The FM unit's role as processor includes many challenges in an ESCO project, but this is also a place where the most important learning takes place in relation to systematically mapping the building stock, optimising energy usage in building operations, engaging in user relations, etc.

The processor role. Second, as a processor, the FM unit collaborates with the ESCO provider in carrying out the energy optimisation of the municipal buildings. This includes numerous tasks, including negotiations and communication with the ESCO provider and communication with the end users. Long-term collaboration with an external partner is unusual for most municipalities, but so is the contract-based partnership, where on the one hand, the two parties collaborate on reaching their defined goals, but on the other hand, the two parties are also clients and providers that must negotiate on various issues, for instance, the baseline that defines whether energy savings have actually been accomplished in comparison to other FM buildings and users during the same period. The ESCO literature traditionally refers to these tasks as transaction costs (Marino et al. 2011; Sorrell 2007), which might be time-consuming, but also

provide the involved FM unit an opportunity for learning. Building a trust-based relationship and reducing the asymmetry between the client and the ESCO provider are two ways to reduce transaction costs, as described by Backlund and Eidenskog (2012).

The demonstrator role. Finally, the FM unit initiates its role as demonstrator in the decision making process—e.g., making promises, setting goals, aspiring to achievements, etc.—related to how the ESCO project will support municipal strategy. Due to the ESCO concept's strong focus on documenting its achieved results, the FM has a favourable position for demonstrating actual results. However, the FM also runs the risk of not achieving results—although the ESCO contract includes guarantees for reaching certain results, this is defined from a baseline, and if other factors influence the baseline, then the results will change accordingly. As an example, the ESCO project in Gribskov municipality set a guaranteed goal of a 17% reduction in energy costs. After the first two years, however, energy prices had risen almost accordingly, resulting in no actual economic savings (although in the case of no energy savings, energy costs would have risen). Explaining this result and other baseline-related issues to the politicians is part of the demonstrator role. However, softer outcomes are also important to demonstrate, e.g., increased user satisfaction, improved learning environments, organisational benefits, spinoffs to other areas, etc.

A proposed model of FM roles in innovation processes during public-private partnerships

In summary, the data that we collected and analysed in this study suggests that public entities' FM units play multiple roles in relation to their different stakeholders, whom they address while innovating during public-private partnerships. We therefore propose a model that describes the three roles that public entities' FM units play during innovation processes that are carried out through public-private partnerships, such as ESCO collaborations. In the model by Kaya et al. (2004), the focus of the internal FM unit is on transforming the satisfaction of stakeholders (i.e., client organisations and their employees, i.e., FM end users) into business needs, which are tackled through workplace management (Kaya et al. 2004). Thus, their model is characterised as sequential and each FM role as mono-directional, with the FM unit acting first as translator, than as processor and finally, as demonstrator, which recalls the usual roles of public entities' FM units during FM innovation, as we visualised in Figure 2.

When a public-private partnership such as an ESCO-collaboration is initiated, however, an external party, i.e., the ESCO company, enters into the dynamics of innovation, which changes the nature of the roles played by the FM unit during innovation processes. In fact, the process overlaps and the roles of the FM unit intertwine with those played by the other stakeholders in the innovation process, as visualised in Figure 2.

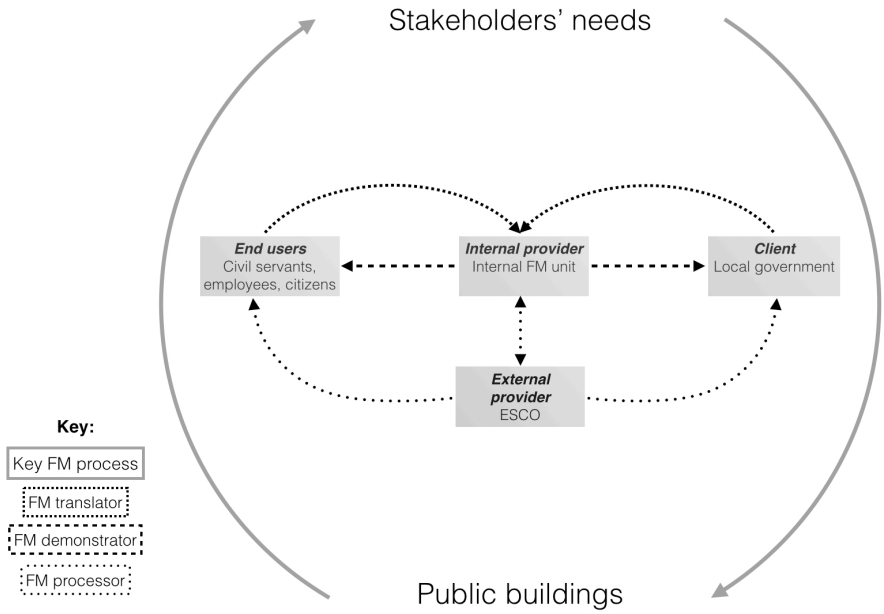

Figure 2: FM innovation processes and FM roles within ESCO collaborations—a visualisation of the proposed model

We argue that during ESCO collaborations, and public-private partnerships in general, stakeholder needs are taken into consideration to guide innovation processes, e.g., energy renovation for managing public buildings, whose outcomes in turn, aim to satisfy stakeholder expectations. When presenting the analytical framework, we have stressed that Kaya et al. (2004) have chosen not to include external provider(s) in their model, and so we did. However, the data suggest that whereas ESCO companies are external provider like those that traditionally (i.e., when there is no public-private partnership such as ESCO in place) have interacted with FM units, they play a different role in the innovation processes that are implemented by means of ESCO collaborations. In fact, in such circumstances, it is the ESCO company that bears the risk of the innovation process and operates as a processor instead of the FM unit, rather than supporting that FM unit, as in the traditional setting presented above.

In other words, the FM unit (1) coordinates between clients and end users by acting as translator and demonstrator; (2) collaborates with the ESCO company to implement energy renovation (FM processor). As mentioned above, the internal FM unit that translates the business strategy into measures for the FM innovation process. However, the client organisation—i.e., the public entity (the local government, in the case of ESCO collaboration)—also needs to translate the FM unit's initiatives into the municipality's policy goals. Similarly, end users might be able to influence the outcome of the innovation process by integrating, i.e., translating, the goals and objectives of the FM innovation process into their routines to benefit from the innovation outcomes. This implies that when an ESCO collaboration is initiated, it is important to gain a different and more complete awareness of the end users, their behaviour and their needs and expectations.

Conversely, both the FM unit and the ESCO provider play the role of FM processor during the innovation process. The former entity acts as the processor in setting the stage and makes sure that the ESCO company processes actual FM innovation outcomes in serving the client, negotiating with the customer (i.e., that same FM unit), and providing the innovated services to the end users. Finally, the FM unit acts as the demonstrator to document the outcome(s) of the innovation to clients and end users (including the community and society).

Discussion and conclusions

The purpose of this paper is to understand how local governments' internal FM units navigate interactions with their internal stakeholders and external private parties related to innovation throughout the course of public-private partnerships. In the public sector, ESCO collaborations are characterised in and of themselves as innovation processes, because they result in outcomes, such as new processes for energy monitoring and new practices of cooperation between intra- and inter-organisational actors, which are ideas—often from the ESCO provider—that are developed and put into practice and provide various benefits to the different parties that cooperate in the development.

We have used an analytical framework based on the existing literature on FM and service innovation to deductively examine how internal FM units navigate innovation processes when they are involved in public-private partnerships such as ESCO collaborations. The literature on FM innovation is still developing, and this study is the first to specifically emphasise the public sector, thereby contributing to a wider understanding of innovation within the FM industry, which is necessary to further develop FM as a discipline (Mudrak et al. 2005). More specifically, this study confirms and extends to the public sector the results of Noor and Pitt (2009) and Tay and Ooi (2001), who have spotted the potential of the FM unit for the innovation agenda of the organisation that it serves. However, our findings suggest how FM units' roles of translator, processor and demonstrator, which they play during the innovation processes of public-private collaboration, are specific to the characteristics of the public sector and related stakeholders. However, by mediating and managing relationships among public and private stakeholders, FM units have the ability to actively contribute to the innovation strategies of the public entities that they serve—in addition to simply supporting end users' daily routines—in a manner similar to their private equivalents.

By analysing 10 ESCO collaborations in Denmark, this paper proposes a model of FM roles in public collaborative innovation processes such as ESCO collaborations. In the model, the three roles that Kaya et al. (2004) have attributed to FM units of private entities (FM translators, FM processors and FM demonstrators) are used to understand how internal FM units of local governments navigate and manage the collaboration of different, intra- and inter-organisational

actors to develop and implement innovation outcomes. The model highlights the overlapping and multi-dimensional nature of the relationships between internal FM units and internal and external stakeholders during FM innovation processes by pointing out how internal FM units (1) coordinate between clients and end users by acting as translators and demonstrators; and (2) collaborate with ESCO companies to implement energy renovation (FM processor).

This paper contributes to the literature on FM innovation by (1) exploring FM innovation in the public sector, whereas existing research tends to focus on private entities; and, most importantly, (2) depicting the coordinating role of local governments' internal FM units, in cases of public-private collaborative innovation. Internal FM units involved in public-private collaborations such as ESCO need to mediate between internal and external stakeholders, keeping in mind the public's interests. This mediation significantly distinguishes internal FM units of public entities from internal FM units of private entities, which facilitate the balance between the strategy, goals and objectives of their client organisations and those of the external providers, while ensuring that the end users can handle their core businesses without distractions.

This work also has practical implications. We offer an insight into the roles and experiences from the first Danish ESCO projects, which aims at informing and inspiring FM units when engaging with FM innovation aimed at energy saving. In fact, the study shows how internal FM units that are involved in public-private collaborations might act towards their intra- and inter-organisational stakeholders to manage public innovation processes: they should first and foremost consider the needs of all of their stakeholders, including the public. It is not only FM units that should clarify what different stakeholders expect from an ESCO collaboration; they also must (1) translate those expectations into actual goals and objectives; (2) process those expectations together with the ESCO company; and (3) demonstrate the fulfilment of those expectations to all stakeholders throughout the process, not just when concluding the collaboration.

Although this study's data were collected in Denmark, the results might also be applied to other countries where private-public collaborations such as ESCO projects drive public innovation. Nevertheless, the Danish market does have specific features, which need to be outlined to evaluate the applicability of our results to other context. First, in Denmark ESCO projects are often highly politically profiled, and represent an integrant part of the municipalities' climate agenda. More specifically, as in other countries, the EU Directive on the Energy Performance of Buildings has been a main driver for governments to encourage the development of energy services (Bertoldi et al. 2007). However, the development of the ESCO market in Denmark has in practice been a combination of legal framework and incentives, market development on the supply side and the municipalities' own ambitions on the demand side. In contrast, other countries experienced a less political development of the ESCO market, which

emphasised the efficiency potential of ESCO collaborations (Jensen et al. 2012). This implies that our model embeds the role of decision making as influenced by politics, whose relevancy for navigation and management of innovation might vary depending on the specific context. Second, few standardisation efforts have been carried out at the national level. This has created heterogeneity in the approaches that local institutions have adopted to implemented ESCO collaborations. In turn, this implies that internal FM units, as well as local governments and ESCO companies do not have a single model to guide their interactions when innovation throughout public-private collaborations. Therefore, the intermediary role of the internal FM unit is amplified as compared to other contexts, such as Sweden, in which dynamics of interaction are more standardised (Jensen et al. 2012).

Finally, this study is not free of limitations. First, the data were collected from a limited sample of ESCO collaborations in Denmark. To increase the external validity of the study, therefore, future research should investigate collaborative innovation in ESCO (and other forms of private-public) collaborations outside of Denmark. Second, the ESCO collaborations were studied in their initial stages of development, which implies that further investigations should be conducted to understand further developments in such public-private collaborations and their impact on public innovation.

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Appendix 1

Interview guide for in-depth interviews

Background, objectives and status:

- Please describe the ESCO project in your municipality: purpose, stages, partners, status, organization, types of buildings and the organization for building operation.
- How did you arrive at the decision that you wanted to engage in an ESCO project?
- Concerning the motivation to start an ESCO collaboration, who did the initiative come from (e.g., politicians or management of the FM unit)?
- What considerations lay behind it? What advantages/disadvantages did you consider?
- What were the conditions of the municipal buildings that were the object of the energy renovation?
- Had you carried out any energy saving measures before you initiated the ESCO collaboration?
- How did you set the energy saving goals (e.g., based on building standards, effective installations)?
- What did you consider when deciding upon initiating an ESCO collaboration? How were the more reluctant actors convinced?
- What impact did the energy strategy set by the government in 2008/09 play on the decision making?
- Are there other municipal plans and commitments that interact with ESCO initiative?
- How was the tendering process organized?

Contract and cooperation:

- How is the contract constructed?
- Why was the specific partner selected?
- Are there any special requirements on the management of the ESCO collaboration embedded in the contract? If yes, how? Did anyone assist you in negotiating the contract?
- How is the ESCO collaboration anchored in the municipality? Who has responsibilities on the contract? Which parties internal to the local institution are involved in the ESCO project?
- How have users of municipal buildings (including the operating staff) been involved in the decision-making on the ESCO project? How are they involved in its implementation?
- Is all the contact with users left to the ESCO company?
- Does the contract include requirements for training and education of operational staff?

Experience and learning:

- How did you experience the ESCO project process so far?
- Which barriers and drivers have you encountered?
- What has been the best experience? What are you most proud of? And on what issues do you feel that it could have been done better?
- How is the ESCO project effecting your facilities management/property management in terms of, e.g., organization roles and tasks, new ways of thinking, implemented energy solutions, learning and so on?
- Has the ESCO collaboration lead to different relationships with users and other administrations?
- Can you apply the learning from the ESCO project to other contexts?

Opportunities and Perspectives:

- Which are the future opportunities, if any, for ESCO collaborations in the municipality?
- In your perspective do you think that your experiences might be relevant to other public or private building owners (e.g., in case of other types of public buildings and/or property owners, such as commercial, residential)?

LIST OF PUBLICATIONS

In chronological order:

Nardelli, G. (2015). The interactions between innovation in services and ICT: A conceptual typology. *International Journal of Information Systems in the Service Sector*, Forthcoming, 7(3). (Paper 3)

Nardelli, G., Jensen, J. O., & Nielsen, S. B. (2015). Facilities management innovation in public-private collaborations: Danish ESCO projects. *Journal of Facilities Management*, Forthcoming, 13(2). (Paper 5)

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